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ETHNOLOGY.—*The Sinhalese caste system of central and southern Ceylon.*[1]

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The caste system of India is a growth of such vast dimensions that it requires an approach by local surveys of a fairly intensive nature before any relevant ideas can be acquired concerning the structure as a whole. Geographically there is a wide range of variation in the development of the caste relations from the more complex groupings of the Ganges Valley to the simpler units of the peripheral areas such as the Laccadives and Ceylon. It seems both logical and easier to commence a series of local surveys with the areas of simpler development and gradually work up to the more complicated relations in areas of central caste specializations.

In Ceylon the number of castes is fewer and the complexity of their relations is much less marked than on the mainland in India proper. European penetration has to a greater degree than in India broken down the indigenous system of social and economic stratification. This process of economic change, if properly studied, should as a clear example be an aid to the understanding of the caste relationships both here and elsewhere in India.

Ceylon is divided primarily between two peoples, the Sinhalese of the south and central areas and the Tamils of the north. The former number over 3,500,000; the latter about 790,000, or 15 percent of the total. In addition there are about 325,000 Moors, or Mohammedans, on the coasts of the northeast and northwest. The Sinhalese and the Tamils each possess a caste system peculiar to their own nationality. The Tamils, being in a minority and sharing the social stratification of their fellow nationals in India, are not considered in this paper except where they show relationships with the Sinhalese. The Moors do not appear to have castes.

The most important items of inquiry to which the present paper is devoted relate to the identity of the Sinhalese castes, the nature of their membership, their location past and present, their origin, and their differences in customs and manner of life. By assembling the known facts concerning Sinhalese social stratification it is possible that a contribution will be made not only to the understanding of caste in India but to the science of human social stratification in general.

HISTORICAL BACKGROUND

According to Arthur Perera (1917, p. 26)[2] the Sinhalese castes probably had a tribal basis. The lower castes, he says, formed tribes of a prehistoric Dravidian race, the *Rakshas* of tradition, who drove into the interior the still earlier Australoid Veddas, who were the *Yakkas* of tradition. Later the higher castes of northern India entered Ceylon, and the frequent subsequent contacts with the Deccan in historical times led to the formation of the artisan castes.

The original Sinhalese Kingdom comprehended most, if not all, of the present Island

[1] Received November 28, 1944. The transliterations of Sinhalese words in this paper are presented as they are given in the literature. It will be noticed that some of the caste names have a variety of spellings. Some writers use ch for c, sh for s, c for ś. Coomaraswamy in his work on *Medieval Sinhalese Art* gives a clear and consistent system of transliteration. Appendix IV at the end of this paper gives an official transliteration of the main caste names.

[2] Complete references are given in the Literature Cited.

of Ceylon and was founded, according to historical tradition, about 504 B.C. by Vijaya, an immigrant chief from either Bengal or Gujarat. Among other elements of culture that he is credited with having introduced into Ceylon the caste system was notable. Vijaya's Sinhalese appear to have colonized the entire southern part of Ceylon, both highland and lowland, displacing the aborigines as they proceeded. Later accounts tell of continued struggles with the Tamils in northern Ceylon, but whether these Dravidian people arrived at a prior date is subject to dispute.

The contests between the apparently Aryan Sinhalese and the Dravidian-speaking Tamils continued until A.D. 1505, when the coming of the Portuguese introduced European influences for the first time. The explorers and colonists from Portugal were able to subdue only the lowland coastal areas. Here they carried on a brisk trade in cinnamon bark and converted about a tenth of the natives to the Roman Catholic faith. In the highlands the independent Sinhalese of Kandy succeeded in maintaining their Buddhistic traditions, caste customs, and economic life in relative independence. The impress of 133 years of Portuguese rule still remains in the culture of lowland Sinhalese today and helps account for their many differences from the highlanders or Kandians. The economic life of the lowland castes was affected by the European overseas plantation culture, while the aboriginal economy of the interior castes was largely medieval and self-contained.

The Dutch attacked the Portuguese forts in Ceylon about 1638 and in a series of sanguinary campaigns completely ousted them from their coastal settlements by 1658. They were aided by disgruntled Sinhalese whose caste system had been disrupted by the impressment of men of high caste as coolie labor by the Portuguese. For more than a century the Dutch now monopolized the cinnamon trade and firmly installed the Romano-Dutch law among the lowland Sinhalese. The Cinnamon-peeler caste was greatly augmented by many new recruits during this period, and friendly relations were maintained with the independent Kandian Kingdom of the interior.

In 1795 the English assailed the Dutch colony of Ceylon and added it to their growing domains in British India. Later, Ceylon was separated as a Crown colony. Within a few years continued conflict with the native independent Kandians was terminated by the conquest of the highland area by the British, and the native dynasty was extinguished. The Kingdom of Kandy in 1802 was still organized on the basis of an interchange of goods and services between castes as part of a vast native civil service dependent upon the king and his nobility for its existence and stability. With the introduction of British rule this system rapidly collapsed, and a European plantation economy, marked by the cultivation of coffee, tea, cacao, rubber, and other tropical products, was introduced into the highlands.

The castes that had formerly performed certain functions exclusively were now forced to take up vocations outside of their former sphere, although they still maintained to a large degree their restrictions on intermarriage with other castes.

DIFFERENCES FROM INDIA

According to Denham the Sinhalese caste system differs in the following respects from the system in India proper (Hayley, pp. 146–147):

(1) The Sinhalese, being of a homogeneous race and religion, do not have the complexity of Indian castes, with their mingling of tribes, races, and religious orders.

(2) The Sinhalese castes are more or less alike in language, dress, and customs, with a few notable exceptions, whereas the Indian castes differ greatly in these items.

(3) Buddhist tolerance in matters of caste has eliminated the technical religious sanctions and complicated rules prevailing in India.

(4) There are no Brahmans in the Sinhalese caste system, and their place is taken by the comparatively autocratic central government in the native kingdom.

(5) The native Kandian Kingdom, by organizing the people under state departments each under the control of a crown officer, supplied the economic needs of the realm. Thus a system of state socialism was effected by hereditary occupations under official direction.

(6) Sinhalese caste emphasizes duties, while Indian caste is concerned with customs and habits.

(7) In the Sinhalese system no distinct order of precedence of castes seems ever to have been agreed upon.

(8) The religious sanction is lacking in the Sinhalese system, but popular psychology and government control operate through the *ninda* overlords and the authority of the native courts to enforce the caste rules.

(9) In Sinhalese society such matters as legal rights and liabilities, distinctions of name, salutation, comfort of living, liability to degradation to slavery, and penal restrictions all help to maintain caste. In India proper slavery is rare, legal rights are interpreted by the Brahmans rather than by royal officers, and other bases of caste distinction are imposed.

SOURCES

The literature describing caste as it has developed among the Sinhalese is not extensive. From 1665 until the present time about 30 writers have listed, with varying degrees of completeness, the names of the Sinhalese caste groups. The number listed runs from 7 to 63. Most of these writers content themselves with merely itemizing the castes and furnishing a few characterizations of major groups. Some list the castes in their order of strength or membership, others in their hierarchical status from highest to lowest; while still others classify the castes in terms of their occupational specialties. Alphabetical lists are not given, possibly because of the mixture of English and native terms used as caste names.

OCCUPATION AND STATUS

The titles or names of the castes are primarily occupational, but there exists a rich synonymy of terms, especially euphemistic titles, which are inspired by the native politeness and well-bred manners of the Sinhalese. The Cultivators rank highest, followed by the Fishermen, Toddy-drawers, Cinnamon-peelers, etc. (Upham, vol. 3, pp. 352–353). At the base of the system are the *Rodias*, or Outcastes, a group of wandering beggars.

Social status, while ostensibly based on occupation, is probably in the main dependent upon numbers and racial background. The most numerous caste, the Cultivators, or *Vellalas*, constitutes about two-thirds of the Sinhalese population and also ranks highest in status. Persons of low caste are traditionally descended from groups outcasted by royal action or of low degree because imported from beyond Ceylon. Some of the caste terms are synonymous with those used by the Tamils and the Malayalam-speaking peoples. Such terms are *Vellala* (Cultivator) and *Achari* (Smith, or Artisan). The occupational spe-

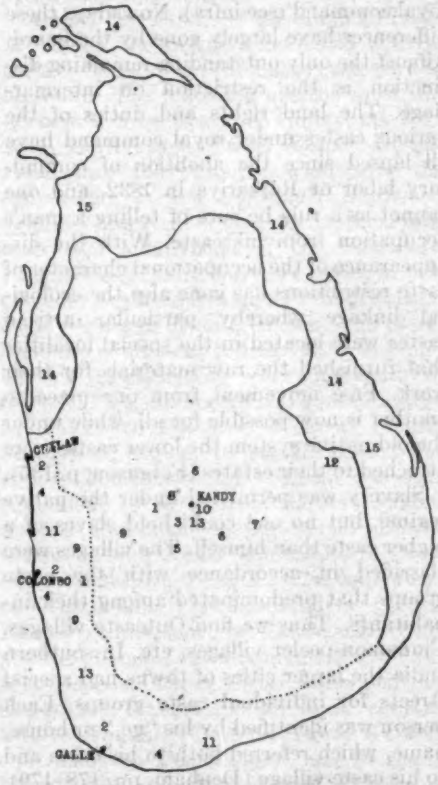


FIG. 1.—Map of Ceylon, showing in schematic fashion the general location of certain Sinhalese castes, Tamils, and Moors. *Solid line:* Boundary between Sinhalese and Tamil-Moor areas. *Dotted line:* Boundary between coastal, or lowland, Sinhalese and Kandian, or highland, Sinhalese. *1*, Agriculturists; *2*, Cinnamon-peelers; *3*, Drummers and Weavers; *4*, Fishers; *5*, Jaggery-makers; *6*, Lime-burners; *7*, Mat-weavers; *8*, Outcastes, or *Rodias; 9*, Potters; *10*, Smiths and Artisans; *11*, Toddy-drawers; *12*, Veddas; *13*, Washers; *14*, Tamils; *15*, Moors, or Mohammedans.

cializations of particular castes and their grouping resemble the system found in southern India. For example, the phrase "five performers of services," or "five village servants," is used in both the Sinhalese system and the Indian in referring to the Carpenters, Weavers, Washers, Barbers, and Shoemakers (Coomaraswamy, pp. 178–179).

In older times there were basic distinctions in dress, dwelling types, and character of food between the castes, which were imposed by sumptuary laws under royal command (see infra). Nowadays these differences have largely gone by the board. Almost the only outstanding remaining distinction is the restriction on intermarriage. The land rights and duties of the various castes under royal command have all lapsed since the abolition of compulsory labor or Rajkariya in 1832, and one cannot as a rule be sure of telling a man's occupation from his caste. With the disappearance of the occupational character of caste restrictions has gone also the ecological linkage whereby particular artisan castes were located in the special localities that furnished the raw materials for their work. Free movement from one place to another is now possible for all, while under the old native system the lower castes were attached to their estates (Ferguson, p. 135).

Slavery was permitted under the native regime, but no one could hold slaves of a higher caste than himself. The villages were classified in accordance with the caste groups that predominated among their inhabitants. Thus we find Outcaste villages, Cinnamon-peeler villages, etc. In southern India the larger cities of towns had special streets for individual caste groups. Each person was identified by his "ge," or house, name, which referred both to his caste and to his caste village (Denham, pp. 178–179).

In addition to distinct traditions of origin some of the castes formerly possessed badges or ensigns peculiar to their own group and symbolical of traditional events or objects connected with their history or occupation. Thus the Fisherman caste, or *Karawe*, had a fish on their flag, while the Artisans, or Smiths, had an ape, the symbol of Hanuman, king of the monkeys and prominent in their legends (E. W. Perera, pp. 20–23).

BUDDHISM AND CASTE; ROMAN CATHOLICS

The Buddhist religious functionaries have in the past been selected entirely from the *Goigama*, or Cultivator, caste since the respect required for the religious office could be consistent only with one of high caste. The higher grades of castes that rank immediately after the *Goigama*, however, are not professedly excluded from the religious worship of the Buddhist faith by any formal ordinances. Lay brothers of low caste called *Silvat* frequently led a life similar to that of the *Goigama* functionaries and performed minor religious duties. These low-caste officials were not, however, formally ordained, nor were they treated with any distinction (Pridham, vol. 1, p. 313).

The Siamese sect of Buddhists was founded about 1750 and had its stronghold in Kandy. It admitted only *Goigama* to its membership, which constituted about half of all Sinhalese Buddhists. The *Amarapara* and *Ramanya* Buddhist sects were both founded later than the Siamese sect and under Burmese influences. They, in contrast with the Siamese sect, profess to admit all castes to their membership but in reality are asserted to admit only *Karawe*, or Fishers, along with Cinnamon-peelers and Toddy-drawers, the three highest-ranking castes next to the Cultivators. The *Amarapara* and *Ramanya* predominate in the low country and now constitute about 34 and 16 percent, respectively, of the Sinhalese Buddhists. In the highland area these two sects together constitute less than 10 percent of the Buddhist Sinhalese. Although in the lowlands the Siamese sect numbers only about 20 percent of the Buddhists, they own all the temples (Copleston, pp. 250–252).

Sinhalese Buddhism is not alone in its tolerance of caste, since we find that the Buddhists of Kashmir, Nepal, and ancient Hindustan also maintained caste differences. As in orthodox Hinduism, persons engaged in occupations requiring the killing of and contact with dead animals or human

beings, such groups, for example, as grave-diggers, butchers, executioners, fishermen, and leather-workers, are all outcasted.

About 10 percent (300,000) of the Sinhalese are Roman Catholics. This group is mainly located in the lowlands and consists of converted Fishers, Cinnamon-peelers, Toddy-drawers, Washers, and Cultivators. The Ceylon police records under the title of "Hue and Cry" in the Ceylon Government Gazette showed during the period 1905–1907 the following numbers of Roman Catholics among Sinhalese castemen: *Goigama*, 935 persons, 68 R.C., or 7 percent; *Karawe*, or Fishers, 158 persons, 60 R.C., or 38 percent; *Halagama*, or Cinnamon-peelers, 98 persons, 21 R.C., or 20 percent; *Wahumpura*, or Jaggery-maker cooks, 94 persons, no R.C. because this is primarily a highland caste; *Durawe*, or Toddy-drawers, 69 persons, 12 R.C., or 17 percent; and *Radaw*, or Washers, 34 persons, 4 R.C., or 11 percent.

RELATIONS TO THE MALDIVIANS AND TO THE TAMILS

The Maldive Islands to the southwest of Ceylon are inhabited by a Moslem people whose speech is related to Sinhalese. It is generally believed that the culture of the archipelago stems historically from Ceylon. The various writers who first reported on the Maldives detailed four major caste groups—(1) the *Bandara*, or royal caste, which was composed of the sovereign and his relatives, (2) the *Didus*, or persons of high dignity who might intermarry with royalty if specially permitted and carried hereditary titles of nobility, (3) the *Manike* or *Maniku*, who were the gentry, and (4) the *Kalo*, or *Kamulo*, the common people, made up of artisans, tradesmen, and persons engaged in ordinary occupations. Apparently the nobility was more of a class than a caste, especially in relation to the first rank and since some were given titles from the gentry (Bell, 1917; Hockly, p. 111).

The *Maniku* would seem to correspond closely with the *Goigama*, or Cultivator, caste, while the lower Sinhalese castes would correspond with the *Kalo*. It is noticeable that the Moslems or Moors of Ceylon itself are divided into four classes: merchants, weavers, fishermen, and barbers. The Maldivian occupational equivalents to the lower Sinhalese castes occur in the following examples: Fishers, Lac-workers, Mat-weavers, Carpenters, Goldsmiths and Silversmiths, Blacksmiths, Tailors, Barbers, Masons, Weavers, and Toddy-drawers. The available literature does not indicate, however, that these occupations were hereditary and characterized by in-marrying restrictions.

Among the Tamils of the north and east of Ceylon the occupational-caste equivalents to many of the Sinhalese castes are to be found. The following are the most important of these (based on Chitty, pp. 231–234): Cultivators (Tamil *Vellala* are divided into four groups, which are the equivalents of the *Goigama*); Herdsmen (Tamil *Idayer* are equivalent to the *Pattiwala Aya* subdivision of the *Goigama*); Fishers (the Tamils have six castes in this category as the equivalents to the *Karawe*); Toddy-drawers (Tamil *Nalawers* and *Shanavars* are equivalent to the *Durawe*); Lime-burners (Tamil *Kadeyers* equivalent to *Hunno*); Palanquin-bearers (Tamil *Chiviyars* equivalent to *Paduwo*); Weavers (Tamil *Seniyers* equivalent to *Chalias* and *Berawayo*); Tomtom-beaters (Tamil *Parreyar* equivalent to *Berawayo*); Barbers (Tamil *Navider* equivalent to *Embattayo*); Blacksmiths (Tamil *Kaller* equivalent to *Camburo*); Goldsmiths (Tamil *Tattar* equivalent to *Navandanno*); Brass-founders (Tamil *Kannar* equivalent to *Lokuruwo*); Carpenters (Tamil *Tatcher* equivalent to *Vaduvo*); Masons (Tamil *Sitper* equivalent to *Galwaduwo*); Tailors (Tamil *Paver* equivalent to *Hannali*); Potters (Tamil *Kusaver* equivalent to *Badahelayo*); and Washers (Tamil *Wanna* equivalent to *Radaw*).

ECOLOGICAL FACTORS

The principal varieties of environment in the Sinhalese area of Ceylon are: (1) the forests of the uplands, (2) grassy areas of both upland and lowland, (3) cultivated area of upland and lowland, and (4) the coastal areas. Each of these environmental

types requires a definite mode of life, and the castes that fit one type may not be well adapted to life in another. In the forested uplands dwell the Veddas, the nearest equivalents to the hill tribes of the south Indian mainland. The Veddas are divided into settled and wandering groups. The economy of the wandering Veddas involves a competition with bears for the fruits and wild honey of the forests and with the leopards for the deer and wild boar, which they hunt in both pasture and forest.

Under the native regime the *patena*, or grassy areas, of the western part of the Island were used for pasturage rather than for cultivation. The *talamas*, or grassy meadows, on the eastern side of the Island were scarcely utilized at all. In the northwest coastal semidesert areas population was also sparse. The Sinhalese part of the Island was divided from the Tamil by a forest band running from the northwest to the southeast and including much of the highland areas.

The cultivated areas were mainly inhabited by the *Goigamas* and their allies. The upland areas included terrace cultivation of rice, while the lowland cultivation was in the river basins near the sea. In the upland the *Goigamas* cultivated cocoa, tea, rubber, and in modern times coffee. The occasional broad and marshy plains of grass were not much used in cultivation. In the upland the kitul palm furnished the jaggery or palm sugar extracted by the *Hakuru* caste, the grasslands material for the Grass-cutter caste and for the Mat-weavers, while the clayey river beds and fields furnished material for the Potter caste. The cinnamon tree flourished in the lowlands and furnished a basis for subsistence to the *Chalia*, or Cinnamon-peeler, caste. In this area also occurred the coconut palm, the basis of toddy and the subsistence of the Toddy-drawer caste. Finally, on the coastal or maritime area proper were the *Karawe* caste—fishermen, carpenters, and handymen of the castes. In addition to the above-mentioned crops the lowlands permitted the growth of rubber, citronella grass, and the areca palm. The last was the basis of betel chewing.

For each of the occupational castes, then, can be plotted an area of distribution in terms of the location of minerals, plants, animals, topographic features, and climatic characters most intimately related to the caste activities. These caste areas of distribution tend to cluster around highland and lowland and thus reinforce the basic distinction in mode of life between Kandians and lowlanders.

The castes were linked together in the production and servicing of items of material culture. For example, the *Achari*, or Blacksmith caste, constructed the chunam boxes to hold the betel-nut and the areca-nut cutters, the Lime-burner caste produced the lime that must be chewed with the betel, while the areca palm was cultivated by *Goigamas*. As another example the building and operation of Buddhist temples required the services of carpenters in the Artisan caste, of stone workers also in that caste, of Cultivators, Painters, Tomtom-beaters, Washers for temple linen, of Potters for sacred vessels and of Ivory, Lac-, and Wood-workers. Thus a fine degree of cooperation was required, involving the products of several different types of environment. Since the most of the castes lived by the material goods produced or services rendered, they appear to have been definitely linked with the ecological areas of the Island.

Not only were the castes localized in terms of environmental materials but they also had their own streets and quarters in the towns, as we have already intimated. Thus Pridham in his account of Ceylon (1849, vol. 2, p. 682) mentions that the site of Madoola still had in his time straight fields bearing the names of streets, such as Tomtom-beaters' Street, Potters' Street, etc.

Localization of Sinhalese castes can be determined specifically by their classified sources of livelihood. The latter may be roughly divided into four categories, animal, vegetable, mineral, and special services. The castes exploiting animal resources are: (1) the nonsettled Veddas, who subsist on honey and on deer and wild boar and consequently live mainly in the hill forests; (2)

the Elephant-catchers, who must also haunt the hill forests; (3) the Fishers, who subsist on edible marine fish on the coasts and coastal rivers in the mangrove and palm areas; (4) Scavengers and Leather workers, who, along with the Pastors, inhabit the sections in which stock abounds, i.e., primarily the cultivated lowlands; (5) the Lac-collectors and workers who are dependent on the hill forests where the trees inhabited by lac insects are found.

The castes exploiting vegetable resources are (1) the *Goigama*, who depend primarily on rice and vegetables and who are found in the areas of coastal and upland rice cultivation; (2) the Cinnamon-peelers, who are definitely limited to the western and southern coasts where the cinnamon tree abounds; (3) the Jaggery-makers, who are situated mainly in the highland areas of the kitul palm and other sugar-bearing trees; (4) Toddy-drawers, who tap mainly the coconut palm, a tree found in the long settled coastal areas of the south and west; (5) Grass-cutters, who are mainly in the grassy uplands; (6) Tree-fellers, who were timber cutters in the hill forests; (7) Weavers, who were located in the areas that produced cotton, namely, the highlands; (8) Mat-weavers, who wove materials such as rattan and reeds found in the upland grassy and swampy areas; (9) Basket-makers, who were similarly employed and lived in similar areas; (10) Gardeners, who cultivated flowers in the uplands areas; and (11) Carpenters, who subsisted by their labor on economic woods from the hill forests.

The castes whose major source of livelihood lies in mineral resources are (1) Potters, who were wont to collect their clay from cultivated areas (ricefields) and riversides in the uplands; (2) Smiths, who were located in the uplands near the sources of iron ore, which latter was extracted for them by the *Yamannu;* (3) Gem-collectors, a division of the *Goigama* who haunted the river beds and earth deposits of the Ratnapura region in the highlands; and (4) Lime-burners, who burned coral rock, wood, and other materials for lime and charcoal in both upland and seacoast.

The service castes, whose major duties were ceremonial and sumptuary, were (1) Barbers, located at the royal court; (2) Palanquin-bearers, who were mainly in demand at the royal court or the towns of the overlords; (3) Tomtom-beaters, who were most important in services connected with planet and devil worship and with temple rites; (4) the Dancers, who were similarly employed and located; (5) Washers, who served all the castes in rites of ceremonial purification and whose location was consequently the same as the other groups; (6) Tailors, who were located at the royal court in Kandy, as were also (7) the Silversmiths and Goldsmiths.

CASTE NUMBERS

No available census records exist of Sinhalese caste numbers. Evidently the European administrators of Ceylon thought that it was possible to make this social phenomenon disappear by ignoring it. According to Coomaraswamy the most important caste groups in the Kandian population are: *Goviyo* (*Goigama*); *Kamburu* (*Navandanna* and *Galladdo* artificers); *Vaduwo* (Carpenters and Blacksmiths); *Radav* (Washers or Dhobies); *Duravo* (Toddy-drawers); *Kumbakarayo* (Potters); *Beravayo* (Musicians, Weavers, Astrologers); and *Paduwo* (servile Cultivators, Palanquin-bearers) (Coomaraswamy, p 22).

An examination of the caste data reported in the "Hue and Cry," or Ceylon police records, for 1905–1907 shows the following (1) numbers, (2) percentages, (3) estimated number in the gross population, and (4) (where available) the number shown by the 1901 census of occupations: *Goigama*, 935, or 60 percent, est. 1,400,000; *Karawe*, 158, or 10 percent, est. 237,000. Fishers by occupation 38,504; caste not recorded, 104, or 7 percent; *Halagama*, 98, or 6 percent, est. 147,000; Cinnamon-peelers by occupation 15,222; *Wahumpura*, 94, or 6 percent, est. 141,000 (Cooks of Jaggery-maker caste); *Durawo*, 69, or 3 percent, est. 103,000, Toddy-drawers by occupation 11,836; *Radaw*, 34, or 2 percent, est. 51,000, Washers by occupation 29,749; *Navandanna*, 26, or 1.5 percent, est. 39,000,

Goldsmiths and Silversmiths by trade 14,361; *Hunno*, 23, or 1.5 percent, est. 34,000, Lime-burners by occupation 870; *Salagama*, 16, or 1 percent, est. 24,000 (Weavers); *Batgama*, 13, est. 18,000 (Laborers); *Duraya*, 13, est. 18,000 (Laborers); *Paduwa*, 13, est. 18,000 (Laborers); *Hakuru*, 7, est. 10,000, Jaggery-makers by occupation 803; *Berawa*, 5, est. 8,000, Tom-tom beaters by occupation 1,649; *Oliya*, 5, est. 8,000, Dancers by occupation 5,423; *Badahela*, 5, est. 8,000, Potters by occupation 9,678; *Pannaya* 3, est. 4,500 (Grass-cutters); *Badala*, 2, est. 3,000 (Silversmiths); *Rodiya*, 2, est. 3,000 (Beggars); *Hedidemala*, 2, est. 3,000 (*Tamils*); Vedda, 1, est. 1,500 (Primitive Hunter); *Parava*, 1, est. 1,500 (Tamil); *Pannaderia*, 1, est. 1,500 (Grass-cutters); *Demalagattera* 1 est. 1,500 (Tamil Slaves); and *Porokara*, 1, est. 1,500 (Axmen).

It can be safely assumed that the traditional caste occupation is generally disregarded today. A very small minority of the *Karawe* are fishermen; of the *Halagama* cinnamon-peelers; of the *Durawo* toddy-drawers, etc. On the other hand, the great majority of the *Goigama* are still rice-cultivators; of the *Radaw* washermen and of the *Navadanna* goldsmiths. Pieris (n.d., vol. 2, pp. 256–258) asserts that the Portuguese first violated traditional occupations by forcing large numbers of the *Goigama* to do coolie labor, and other sources assert that the Dutch were likewise guilty of violations of caste regulations in regard to occupation (Tennent, 1889, vol. 2, pp. 123–124).

CASTE SERVICES, VILLAGE TYPES, AND SUMPTUARY LAWS

In the native Kingdom of Kandy there existed a system of forced labor, the so-called *rajkaria*, in which royal authority was employed to allocate the different occupations of the realm among the available labor supply. Families performed the tenant services by turns, i.e., alternating in giving their services under public officers in return for their land holdings. At a late date the labor services might be commuted by a money payment (Coomaraswamy, 1908, pp. 22–24).

Some of the more important lines of special service performed in the native Kandy Government included messenger or guard duty (*Atapattu vasama*); husbandman (*Ganvasama*); military duty (*Heva vasama*); artificer work (*Badal panguwa*); potter work (*Badahela panguwa*); musician (*Davul panguwa*); washermen service (*Rada vasama*); servant (*Nila vasama* or *Uliyam vasama*); iron-smelting (*Yamanna*); and outcaste services (*Rodiya*). (*Ibid.*)

There are six departments in the Kandian Government, as follows: *Kottalbadde*, or Artificer's Department; *Badahelabadde*, or Potters' Department; *Radabadde*, or Washers' Department; *Handabadde*, or Mat-makers' Department; *Kuruwe*, or Elephant Department; and *Madige*, or Carriage Bullock Department (D'Oyly, pp. 7–18). Each department was organized with a hierarchy of officials responsible for the performance of duties by the particular castes concerned with work in that department.

The work of the departmental officials was made easier by the caste segregation in specific villages. In fact, each village was classified according to the type of caste or service to which it belonged. The following were the more important types of village: (1) *Gabada-gama*, a royal village or manor that was the private estate of the king and consisted of crown lands cultivated under the half-share system; (2) *Bat-gama* villages inhabited by the *Paduwo* caste of low status (their services included carrying the hinder parts of palanquins, watching the house or fields, and other menial work), who could never acquire any permanent rights to the land; (3) *Biso-gama*, or royal villages set apart for the *Pallervahala* or queen's palace or for the royal household on the same terms as the *Gabada-gama* (this type of village, along with the first and second, was inhabited by degraded castes who as tenants could be ejected at any time in favor of some other caste at the will of the king); (4) *Vihara-gama* type villages belonged to some Buddhist temple and services were performed for the priesthood; (5) *Devala-gama* were villages belonging to some Hindu temple or deity with services as in (4); (6) *Nindagama* was a

village under the entire protection of a local chief or landlord, and tenure of land was conditioned by service to him; (7) *Vidanegam* was a village of low-caste people liable to public services under *Vidanes*, or headmen; (8) *Wedi-gama* were villages inhabited by Veddahs; (9) *Gattaru-gama* were inhabited by persons who had been outcasted by the king; (10) *Gahala-gama* were inhabited by executioners, scavengers, and persons of extremely low caste; and *Kuppayama* were villages of *Rodiyas*, the hereditary outcaste beggars. (Denham, pp. 191–193; Coomaraswamy, p. 27.)

Not only were the castes segregated in terms of departmental services and village residence, but they were strictly regulated as to the goods they might use for clothing and the kinds of houses they might inhabit. Barbers wore doublets but could not sit on stools. Potters wore no doublets and could not sit on stools. Only the king could wear certain types of gold or silver jewelry, an eight-cornered hat, shoes, stockings, or trousers, be served with an umbrella, or live in plastered walls under tiled roofs and in two-story dwellings. (Knox, in Philalethes, p. 138.)

According to Pridham (1849, p. 597), at one time there was a thriving trade in carved figures portraying the native castes at the town of Matura. Between the low and high castes there were many invidious distinctions of dress. No low-caste woman was allowed a neck ornament except one of the Potter or Smith caste. She could not wear clothing above the waist except in cold weather. Low-caste men were not allowed to wear colored cloth or cloth embroidered with colored thread in Kandy or in the presence of higher castes. (Pamatella, p. 119 ff.).

NAMES AND CASTES

The *ge* name is a surname used before the personal name—a praenomen—and is so called because of the ending *ge* or *geyi* generally affixed to such surnames. The word *varige* and *vasagana* are used to express these surnames. The *ge* name is the most important part of a Sinhalese proper name as it usually reveals the rank, occupation, residence, caste, native place, or some characteristic or achievement of the original ancestor of the family bearing the *ge* name. Thus *Bentarahunuge* indicates a Lime-burner caste (*Hunu*) and the type of village (*ge*) whence the person came. Persons of Washerman or Barber caste often drop the part of the name showing occupation and assume the family name of the person they serve. In some instances names are changed where they furnish impediments to securing suitable marriages for sons and daughters. The *Goigama* formerly named their children about 16 days after birth, while the other castes allowed 32 days to elapse. The wife keeps the *ge* name of her father after marriage. (Denham, pp. 178–179.)

In former times personal names were restricted to the particular castes, and this is still the practice in some parts of the Kandian area. Although today it cannot be said that a particular name belongs to a certain caste, the termination usually indicates whether the bearer of the name is of high or low caste. Modes of salutation vary greatly with the caste and rank of the addressee. Terms of affection and endearment are often applied to persons of low caste, such as "uncle" and "aunt" when addressing members of the Washerman caste or "boss" in addressing a Carpenter caste member. (Denham, 1912; Alwis, 1856–58; Hocart, 1938.)

In the earlier days a caste consisted of a group of clans, each clan claiming descent from a common ancestor from whom it took its name. Its name might also be taken from the office he held or from the village whence he came. Hereditary surnames were given to chiefs and the clan name dropped. During the Portuguese ascendancy European surnames were adopted by converts to Roman Catholicism. (A. A. Perera, 1917, p. 26.)

AGRICULTURISTS, OR CULTIVATORS

The *Goigama*, or *Vellala*, the great cultivating caste of the Sinhalese, is given the following synonyms by Upham (1883, pp. 338–339): *Khetta* or *Kettau Jiewakayo*, livers by the field; *Kassakayo*, plowers of

the land; *Goyankaranno*, sowers or cultivators of rice; *Goiyo* or *Goigama Etto*, cultivators (or rice village people); *Goi Bamuno* or cultivating Brahmans; *Goikulayo* or of the cultivating caste; and *Handuruwo* or *Sandurowo*, sons of peace. The plowshare was their flag symbol (see E. W. Perera, p. 23).

This caste was subdivided into a considerable number of subgroups in terms of occupations and hereditary or ceremonial rank and the upper divisions did not formerly intermarry freely with the lower. The upper rank of *Goigama* could marry a *Pattea* (Shepherd) woman, but no man of the latter could dare present openly a claim to a bride in the upper ranks. (Pridham, 1849, vol. 1, p. 235.)

The *Hondrews* (*Hamaduruwo*), or Gentlemen, were distinguished by their names and their clothing. The men wore the cloth halfway down the legs and the women to the heels with one end flung over the shoulder. The *Hondrew* head-covering consisted of two flaps tied over the top of the crown. Their caps were always white or blue and those of inferiors of different colors. (Pridham, *loc. cit.*) The *Hondrew* chiefs and nobles performed various honorary services for the king and paid homage on New Year's Day, presenting a roll of betel leaves. (A. A. Perera, 1903, pp. 336–337.)

Goigama tenants carried messages, supplied betel and areca, kept guard, provided for strangers or visitors, attended during domestic ceremonies, and when necessary cooked provisions or provided buffalo for plowing (*ibid.*).

The duties of the various classes of *Goigama* tenant were highly specialized and carefully delineated. For example, the *Atapattu-wasama*, or messenger class, carried messages, kept guard over treasures, temples, and chiefs' houses, carried state umbrellas in procession, watched threshing floors, and accompanied proprietors on journeys. (Coomaraswamy, p. 24.)

The *Dunukarawasama*, or military class of archers, held land in return for services in carrying letters and messages, keeping guard at the house of the proprietors, watching the threshing floor, and accompanying the proprietor on journeys of state bearing the lance. (A. A. Perera, 1917, App. p. vi.)

The *Dalumura-Panguwa* performed the service of supplying weekly or fortnightly and at festivals a certain quantity of betel leaves for consumption by the officers and priests. This service was of great importance at the royal court, and the king had plantations of betel in different parts of the country complete with staffs of officers, gardeners, and carriers. Later under British rule the tenants of this class supplied betel to proprietors for consumption at home and while on journeys. In some instances a quantity of areca nuts also was furnished. (*Ibid.*, p. iv.)

The *Ganwasama* were a superior class of tenants in the village who supplied the proprietor with subordinate village officials such as *vidanes* (headmen), *lekamas* (writers) and *kankanamas* (overseers). This class was often of the same social standing as the proprietor and sometimes related to him. They were often the wealthiest people in the village, holding the most fertile lands. They had to make heavy contributions to the proprietors and their retinues. This class also provided sustenance and shelter for visitors and strangers. The superintendence of building work at the proprietor's house and the function of presiding at festivals also devolved upon them. The *Ganwasama* accompanied the proprietor on journeys and took the lead in the annual presentation of the tenants before the proprietor. (*Ibid.*, p. vii; Coomaraswamy, p. 24.)

The *Hewawasama* was a military class whose services included carrying messages and umbrellas, keeping guard, and attending at funerals. They also furnished subordinate officials. This class had charge of proprietors' houses, of cleaning and repairing the premises, and of supplying flowers to the temples. (Perera, p. xii; Coomaraswamy, p. 25.)

The *Lekam Panguwa* tenants did duty as writers to the proprietors, superintended working parties and harvesting operations, and appeared before the proprietor at the

annual presentation of the tenants. They also attended the proprietor on journeys, cared for him when he was sick, and helped guard his house. They also occasionally assumed the duty of headmen, but their regular duty was to keep accounts of things received and issued and of arranging and supervising services of tenants. (Perera, p. xii.)

The *Nilawasama* class supplied temples with vegetables for festivals and performed a vast array of domestic duties of outdoor type. They supplied fuel and water to the kitchen and bath, pounded paddy, extracted oil from nuts, repaired walls and floors, transported timber, prepared clay, supplied firewood for brick and tile kilns, blew bellows for the smith and supplied him with charcoal for the forge, broke up limestone, cut banks and ditches, put up fences, cleared gardens, swept out courtyards and compounds, joined in all agricultural operations in gardens and fields such as planting and harvesting, tied straw and assisted in thatching, carried palanquins or baggage on journeys, bore objects in processions, and served in the ceremonies at weddings, funerals, *Yak* (Devil Worship) and *Bali* (Planet Worship) rites. (Perera, pp. xv–xvi.)

Nilawasama tenants were of low status for the most part, and their yearly dues consisted of vegetables and contributions of uncooked food. Beside working for the proprietor they also performed services for headmen and for other classes working in the fields for a few days and carrying their baggage on journeys. Some were placed in charge of temple cattle and provided fresh milk at ceremonies and at New Year's. (Perera, pp. xv–xvi.)

The *Manana* tenants measured out paddy given to be pounded as well as paddy brought in from the fields. This office came to be held by a low class of *Goigamas* and has been equated with those who put up privies, put mud on walls, or carry palanquins, baggage, and torches. They served as messengers for the headmen of the village, watched at the threshing floor, took care of buffalo brought in for plowing or threshing and assisted in the collection of dues. (Perera p. xiii.)

The *Nillemakareyea* or *Pattea* people were not very numerous since their occupation was stock-keeping, and large pasture areas were few in old Ceylon. They were also cultivators and paid taxes in rice, milk, and ghee. They were of inferior status. (Pridham, vol. 1, p. 236.)

The Veddas (*Dodda veddas*) are of *Goigama* caste. They were called *Wanacharakayo*, wild men or men of the desert, and *Weddo* or tormentors because although they fled to the jungle to escape oppression or being tormented they killed animals for a living there. They lived in *Wedigama* villages and were held in low status because of their taking animal life. Under the Kandian regime they were required to furnish the king with wild game. (Upham, vol. 3, p. 346; Pridham, vol. 1, p. 240.)

There were several minor groups of *Goigamas* such as the *Gauraykawallu* or village watchmen and the *Kappuwo* or temple watchmen, the *Hunu gambadu* or coolie peasants who foddered and took care of cattle, and the *Malcaruwo* or flower gardeners. The last were sometimes called *Mawlacawrayo*, or chain makers, because they made garlands or chains of flowers. (Upham, vol. 3, pp. 349–350; Pridham, vol. 1, p. 241.)

The dress of the *Goigama* men consisted of a *lopetti*, a long cloth of two breadths about the loins and extending as far down as the ankle. A cloth about the head was folded like a turban leaving the top of the head exposed. On state occasions a short jacket was worn except in temples. (Pridham, vol. 1, p. 235.)

The dress of the *Goigama* women was a long cloth of a single breadth called a *hala* wrapped around the loins and cast over the left shoulder. On state occasions a jacket was worn with a kind of ruff hanging from the neck over the shoulders. Rings, silver or crystal bangles, and ear ornaments also were worn. (Pridham, *ibid.*; Bennett, pp. 98–99.)

Rank with the *goigamas* was indicated by the rich quality and quantity of apparel rather than by fashion. The highest rank wore the finest embroidered muslin set off by a succession of topetties, often six or

eight in number, with the shoulders unnaturally widened by a jacket stuffed and padded to correspond with the girth of the hips. (*Ibid.*)

According to Coomaraswamy (p. 22) the *Goigama* constitute about 90 percent of the Sinhalese population. This seems to be too high when other evidence is taken into account. The minor groups such as the Veddas have always been small in modern times. The Veddas numbered 2,030 in 1871, 5,332 in 1911, and 4,510 in 1921 (Census of Ceylon).

In the "Hue and Cry" statistics 780 *Goigama* were found in the following occupations: cultivators (317), coolies (266), carters (49), miners (43), domestic servants (27), traders (21), masons (12), carpenters (10), cooks (10), clerks (9), boatmen (6), breadsellers (5), and peons (5). According to the same source the chief crimes charged to 401 *Goigama* castemen were theft (especially of cattle) and housebreaking (234), causing hurt (55), robbery (34), criminal breach of trust (27), habitual criminal (18), assault (9), criminal misappropriation (8), forgery (6), arson (5), and cheating (5).

There are almost a score of divisions recorded for the *Goigama*. They are as follows: (1) Axmen and *Porakara* or *Porawakkarayo* and *Kunammaduwegamayo* (Niti Nighanduwa); (2) Bali ceremonialists, *Balibatgamayo* (Niti Nighanduwa); (3) Betelfurnishers, *Dalaemurecarao* (Valentyn); (4) Bridge-builders, *Waddewassam Karayo* (De Saram); (5) Cattle-tenders, *Pattiwalayao* (Armour) or *Pattiwala aya* (Niti Nighanduwa); (6) Cultivators, *Ratte etto* or *Wellales* (Armour) and *Gombaducarao* (Valentyn); (7) Elephant-keepers, *Etwalapannikkayo* (Niti Nighanduwa); (8) Flowergrowers, *Malkaruwo*, Garland-makers (Niti Nighanduwa) or *Mallaccarao* (Valentyn); (9) Gem-collectors, *Diegaranno* collected from stream beds and *Goddegaranno* collected from the soil (Valentyn); (10) Hunters, *Weddo* (Armour) or *Wediwanse* (Niti Nighanduwa) or divided into *Wanneweddas* and *Dadaweddas* (Valentyn); (11) Milk-suppliers, *Hunkicarao* (Valentyn); (12) Nobility and Gentlemen are divided into *Handuruwo* (Armour), *Bandaarawaliya* (Armour) or *Bandares* or *Adassing* (Dukes, Princes, etc., of Royal Family—Upham), *Appuhamies* (De Saram), *Safframadoo Appuhamies* (De Saram), *Mantriunu* (Privy councilors—Upham), *Mandelliperu* (Military officials and *modeliars*, *adiyars*, *dessaves*—Upham), *Radalakamperuwa* and *Mudeliperuwa* (Armour and Niti Nighanduwa), *Paindi Peruwa* or *Rate Etto* (Niti Nighanduwa); (13) Outcastes from *Goigama*, *Gattaroo* (Armour) or *Gattaru* (Niti Nighanduwa); (14) Seeders, *Batgamwella etto* (Valentyn); (15) Shepherds, *Nilemakkareyo* (Armour) or *Nillamakkarayo* (Niti Nighanduwa); (16) Soldiers, *Hewapannay* (Soldiers and lascoreens—De Saram) or *Gowiperu* (Military and agricultural laborers—Upham); (17) Soothsayers and Jugglers, *Wiramestaragolla* (Niti Nighanduwa); (18) Tamil Fishermen, *Timbillo* (Armour) or *Tibiblo* (Niti Nighanduwa); (19) miscellaneous groups such as *Cariawassin* or *Mayorals* (De Saram), *Kuttanwala etto* (Niti Nighanduwa), *Weeramesseroo* or *Gooroowo* (Armour) and *Kammalhandooroowo* or *Wagayo* (Armour).

BARBERS

The Barber caste was always a small one, since the Sinhalese usually shaved themselves. However, the royal court at Kandy required some barbers. The following synonyms are given for this caste by Upham (vol. 3, p. 343): *Cappakayo*, or cutters; *Nahapikayo*, or comforters; *Karranawiyo*, or razor users; *Pannikkiyo*, which means leaf or foliage cutters; *Ambetteo* or *Embettayo*, i.e., near approachers or livers near in reference to their position as ministers of the royal cabinet and proximity to the king's person.

As a rule barbers shaved only the higher castes. The Barber paid a tax in money for his land and was liable to service as a baggage porter. The annual ceremony of feigned shaving of an image of the Buddha in the Temple at Kandy was performed by a member of this caste with the aid of a looking glass so that he might not desecrate the image by looking at it directly. The manorial lord was always attended by his barber. Barbers had the privilege of wearing

white linen under the Kandian monarchy. Both men and women of this caste could wear doublets but could not sit on stools. Upper-caste Washermen washed for them but would not dine with them. (Pridham, vol. 1, p. 238; Davy, p. 125.) Virchow says that the Barbers and *Hanomoreyo* (betel box-makers of Uva) were even lower in status than *Rodiyas*.

The *vidahn mohandiram*, or caste headman, wore a cloth or linen coat with silk buttons and loops; a sword hilt and scabbard of silver, the latter with two plates of tortoise shell on it; and a belt of colored ribbon embroidered with flowers of silver thread. (Bennett, p. 100.)

Sinhalese Barbers numbered 260 in 1881; 1,287 in 1891; and 1,327 in 1901, according to the Census Report.

BASKET-MAKERS

The Basket-maker caste was apparently a small one. Upham (vol. 3, pp. 348–349) gives the following names for this group: *Sinnawo*, or cutters, referring to their cutting and bringing home of their materials; *Hadayo*, or plaiters, because of their weaving or plaiting of materials; *Welwaduwo*, or rod-carpenters in reference to their use of rods to manufacture articles; and *Cooloopotto*, or peeling winnower makers, because they made winnowers by peeling bamboo cane and reeds. More commonly this group was called *Handee*, or *Handi*. They were required to furnish the stores of the Kandian monarch with baskets and winnows, and were thought to be a beggar caste by some writers. (Pridham, vol. 1, p. 348–349; Davy, p. 129.)

BRAHMANS AND OTHER VARNAS

There are apparently no Brahmans among the Sinhalese of today. Traditionally this caste, however, was present among them and constituted the next to the highest, if not the highest, of all the castes. The Kings, or Rajahs, were members of the *Kshatria Varna* and were the landlords of Ceylon. Regarding the third major division, the *Wysya* (Vaishya) *Varna*, there is some confusion. Buyers and sellers as well as makers of merchandise were once classed as *Wysyayo* and were divided into three categories: (1) dealers or merchandisers, (2) cattle tenders, and (3) tillers of the soil. The merchants, or *Welindo*, seem to have disappeared from the Sinhalese system and their place was taken by the Tamil Chittys and Moslems.

The *Goigama* claimed descent from the *Vaishyas* and held themselves aloof from all the lower groups who were called *Sudras*. Members of other castes assert that the *Goigamas* were originally *Sudras* rather than *Vaishyas*. *Karawe* caste members have laid claim to *Kshatriya* status.

The different divisions of the *Kshoodra Wanse*, or *Sudras*, were organized by the government for its own use and for the benefit of the ruling caste of the *Goigama*. Under the Kandian monarchy each caste had specific duties to pay and certain services to perform and were responsible to officers appointed by the king. Armour lists 18 *Wanam*, or occupations, that in their names were reminiscent of the 18 guilds of the Buddhist Period and the 18 servants of the Tamils. Bennett speaks of the five performers of service, namely, carpenters, weavers, washermen, barbers, and sandal-makers. This recalls the fivefold division of servants into smiths, tailors, washers, barbers, and leather-workers given in the *Janavamsa*. Arthur Perera (1917, pp. 26–27) divides the groups below *Goigamas* into *Naides* (smiths and allied groups), *Durayas* (servants), and professional or service groups including barbers and washers. The *Pancha-chandalo*, or five men of degraded caste, were among the Sinhalese traditionally the washermen, potters, barbers, silversmiths, and tailors. In addition there is the tradition of the *Pas kula* or five tribes (five handicraft castes or traders), viz.: carpenters, weavers, washers, barbers, and shoemakers.

CINNAMON-PEELERS

The following synonyms are given by Upham (vol. 3, pp. 339–340) for this caste: *Paisakara Brahmanayo*, or gold and silver thread weaving Brahmans; *Tantavayo*, or yard-stretching weavers (because they stretched and ordered their warp and wove

it with weft); *Paisacawrayo*, or *Paihairo*, i.e., weavers of gold and silver thread; *Salagamayo*, or *Halagamayo*, i.e., people who inhabit the large hall village (referring to Chilaw on the west coast whose older name was Salawa); and *Mahabadde*, the great rent, referring to cinnamon as the principal source of revenue (they were also called Chalias, or people of Chilaw, sometimes abbreviated to Hali); and *Pesa karayan*, or makers of cloth strainers to filter water.

According to tradition the king of Dambalewa in the Seven Corles, called Walthimi Buwanaika Rajah, six or seven hundred years ago caused a colony of Paisekara weavers to be brought from India to establish a cloth manufactory at Chilaw. Special apartments or large halls were reserved for their use. (Upham, *loc. cit.*; Johnson, pp. 44–84; E. W. Perera, pp. 20–21.)

In later times, with the coming of the Portuguese, these weavers took up cinnamon-peeling as a major occupation. Their numbers were always small and insignificant in the highland area of Kandy, but in the maritime provinces they were numerous. Many have become wealthy and ambitious under European rule. A small branch called the *Velledurai* weavers were described as living chiefly in the barren districts of Neurakalalawa in the north. On the coast the Chalias of today are chiefly clustered about Galle and Chilaw. (Pridham, vol. 1, p. 239; Davy, p. 126.)

The Washermen for the Chalias were called *Hinnevo*. Under the older regime the Cinnamon-peeler caste was not allowed to wear white linen. For their lands they were required to pay a money tax and were liable to be employed in the royal kitchens to fetch firewood, clean *chatties* or pots, and carry provisions. They also served as the bodyguards of the lords, especially on journeys. De Saram (*in* Hayley, p. 101) divided the Chalias into four occupational subcastes—*Paniwidacaraya*, headmen or messengers; *Hewapanne*, or lascoreen warriors; *Cooroondo Caraya*, or cinnamon-peelers; and *Oliyakaraya*, or palanquin-bearers.

The services required of the Chalias of the Seven Corles, a total of about 500 families, included the furnishing of the king's stores with an annual quota of salt fish. They could not wear caps or cloths reaching much below the knees, and the dress of the women was similar to that of the Potter caste.

According to the "Hue and Cry" data the chief occupations of 60 Cinnamon-peelers, or *Halagamas*, in 1905–07 were—cooks 27, cinnamon-peelers 10, carters 8, traders 6, cultivators 5, and carpenters 4. The occupations of 14 Salagama Cinnamon-peelers were—cultivators 7, cooks 4, and cinnamon peelers 3.

Under the European rule in the maritime provinces the Cinnamon-peelers came under a special jurisdiction and ultimately felt powerful enough to dispute precedence with the Fisherman caste. In 1733 they went on a strike against the Dutch Government because of the poor working conditions and income derived for their labors. Their disabilities and the degraded state of the caste generally caused many of them to flee into the highlands. The remainder were able to obtain much more favorable terms with the Dutch cinnamon traders. Although the women were forbidden to do so, the men might marry into the caste next below them. (Pridham, vol. 1, p. 239, footnote; Tennent, vol. 2, pp. 123–124, footnote,157.)

There were, according to the Census, 1,773 Sinhalese cinnamon-peelers by occupation in 1881, 7,899 in 1891, and 15,222 in 1901.

DANCERS

The masked Dancers were a small caste. Their principal designation was *Oliyo*, which is interpreted to mean disguised actor or comedian. According to Upham (vol. 3, p. 350) the term *Uhuliyo* was also applied to this group because they appeared with masked faces and made gestures. To exorcise the Spirits of Poverty, the *Gara Yakku*, the *Oli* performed a special all-day dance called *Gara Yakuma*, wearing special masks. One of the major functions of this group was to carry the large effigies of the *Assooriah* demons in processions at the annual festivals. They are thought to have manufactured these effigies (Pridham, vol.

1, p. 241). Denham (p. 190) gives the honorific term *Bali-eduro*, a teacher of Bali ceremonies, and *Balitiyanna*, one who molds Bali images, to members of this group. Davy (p. 129) terms them *Olee*.

In older days the *Oli* provided the lords of the manors with oil for burning at night and swept out the premises by day. They also assisted in the care of the elephants. They were not allowed the honor of white linen and the *Gangavo* Caste washed for them. (A. A. Perera, 1903, p. 337.)

According to the census, there were 1,520 Sinhalese Devil-dancers in 1881, 3,278 in 1891, and 5,423 in 1901. Devil-dancers might also include Tomtom-beaters.

DRUMMERS AND WEAVERS

The chief synonyms for the Tomtom-beater caste or Weavers were, according to Upham (vol. 3, pp. 346–347): *Atodya-wasakayo*, after Atodya a royal minister who first appointed them to this duty and who himself made and played on the first timbrel or drum with one head, which was later called by his name; *Berawayo*, because they beat the *baira*, or tomtom; *Ganitayo*, or counters (calculators), because they were astrologers and calculators of the motions of the planets. Denham (p. 190) asserts that the term *Panikkiya*, which referred to a headman of this caste, was frequently employed as an honorific title to ordinary members as was *Nekatiya*, astrologer, because of the knowledge possessed by this caste on the subject of the stars. Other terms employed were *Tablinjenos* and *Wajjankarayo*, the latter meaning "tomtom beaters." In general a considerable variety of names were applied to this *Berawayo* caste in terms of the various functions it performed.

According to Valentyn (*in* Philalethes, p. 330) the *Berawayo* had lime-burner, dancer, grass-mower, and deccum-carao (annual poll-tax payers) divisions, each of which had its own superintendents or *manquedams* whom they especially designated as *ulewalia*.

The *Berawayo* did not eat with low castes but could not use white linen, and the *Pally* caste washed for them. On the whole *Berawayo* were numerous and well distributed through the villages. Their major employment was as weavers of coarse native cloth, but they were noted also as musicians and as participants in festivals or rites, beating the drum and giving notice of such events. (Coomaraswamy, p. 232; Parker, 1917, pp. 28–29.) They were experts at rhythm and melody and were devoted also to duties as watchers at temples, sweeping and cleaning temple premises, gathering flowers for temple offerings, and fetching water for the temple. Their services were necessary at weddings, funerals, Yak (Devil-worship) and Bali (Planet-worship) ceremonies, and on state occasions. They paid a tax in money to the Kandian king. In addition they supplied the royal store monthly with vegetables and provided the wooden gutters of the *Ketoolga* tree. In some districts an annual quantity of cloth was provided by them to the manorial lord.

Particular families among the *Berawayo* had lands for their services as pipers, dancers, and players at the great festivals. Temple lands were cultivated by them on the same terms. They were allowed to eat and carry away all victuals offered to the gods and were also reputed to eat beef. The members of the caste who beat the tomtom were called *Tammattankarayo*, while those who wove cloth primarily were called *Dawulkararayo*. Another group was the *Bali-eduro*, who made the clay images for and danced at Bali ceremonies to propitiate the planets. A performer of devil ceremonies in this caste was called *Yakdessa*. (A. A. Perera, 1917, App.; Coomaraswamy, p. 148; Davy, pp. 128–129; Pridham, pp. 240–241.)

The census enumerated 823 Sinhalese Tomtom-beaters in 1881, 2,318 in 1891, and 1,649 in 1901.

ELEPHANT-CATCHERS

The *Weenawo* were a caste devoted to the function of elephant-snaring. They followed the track of elephants and drove them into snares or put them to death in cases of peril or emergency. Special washermen washed for them but would not eat

with them. They did not have the privilege of wearing white linen. (Valentyn, *in* Philalethes, p. 329.)

FISHERS

Upham (vol. 3, pp. 345–346) gives the following synonyms for the *Carawo*, or Fisher, caste: *Wagurikayo*, i.e., workers or dealers in the water, referring to their habit of wading and working in the water; *Jawlikayo*, or workers with nets; *Kay-wattayo*, or surrounders of water, because in fishing they surround a spot in the water; *Kaywulo* of *Kaywattayo*, which means those who dwell near the shore; and *Carawo*, which means "shore people" or dwellers near the shore.

The Fisher caste was evidently divided into a considerable number of sub-groups, and, according to Valentyn (*in* Philalethes, pp. 325–327) the lower ranks were kept separate from the rest. The higher ranks of Fishers participated in the privileges of the *Vellalas* or *Goigama*, and higher washerman were under obligation to wash their clothes. On the great festive occasions the higher Fishers could spread a white cloth on which they could dine and could cover their stools with white cloth also. Their dwelling could be decorated likewise, and they could carry a torch in their processions. They displayed a white flag with the device of a fish or elephant in the center. (Fonseka, pp. 1–11; E. W. Perera, pp. 21–22.) In addition they could carry an umbrella of the *tallipot* palm and in their own lands could have a white calico cloth spread beneath their feet. They possessed military offices and some were appointed to the office of *adigar* by the king. They might be carried in palanquins with drums beat before them on the road in ceremonial parades. (Valentyn, *op. cit.*; Pridham, vol. 1, pp. 236–237.)

The Fishers were members of the *Madege* Department in the government along with the Moors, or Moslems, whose reputation and status they shared. (Davy, pp. 122–123; Pridham, vol. 1, p. 237.) The *Modeliar* and *Mahavidahn Modeliars* of this caste wore a silk or cloth coat with silver buttons and loops; sword hilt and scabbard of silver and with eyes and tongue of the lion's head made of gold, the belt of gold or silver lace but not spangled. The headmen of the *Chandoos*, or Toddy-drawers, shared this costume. (Bennett, p. 99.)

The duties of the *Karawe* tenants included the transportation of the paddy from the fields to the granary and attendance to the carriage department already noted. They also provided fish for the kitchen of the landlord. (A. A. Perera, p. 336.)

Dharmaratne (pp. 27, 40, etc.) divides the Sinhalese castes into two geographical groups, namely (1) Coastal or Lowland *Karawe*, together with their ancient allies the "poetic" *Durawe*, and the "witty" *Chalias*, and (2) Kandyans who comprised *Goigamas*, *Navandannas*, *Badahelas*, and *Wahumpuras*. Further, he would add the Tamil-speaking "Karawe" of the North and east coasts to the Sinhalese *Karawe* caste. Three-fourths of the *Karawe*, he asserts, are today the owners of extensive lands, planters, traders, merchants, etc., and the remaining one-fourth are carpenters, coopers, builders, boatmen, carters, and coolies, with only a scant one-sixteenth engaged in fishing.

In the recent period the *Karawe* have engaged in a vigorous rivalry with the *Goigama* for social position. The period of Portuguese rule was marked by extensive conversion of the *Karawe* to Roman Catholic faith. For this reason the Protestant Dutch favored the *Goigama* over the *Karawe*, it has been asserted. (*Ibid.*)

Under English rule the *Karawe* prospered once more, and their acquisition of new wealth led to the demand early in the twentieth century for better representation in the Legislative Council of Ceylon. Hitherto the *Goigama* had monopolized the position of representing Sinhalese interests on the council. From this situation it can be seen that the caste spirit is still very much alive among the Sinhalese even at the present time, in spite of the decline of the old occupational sanctions. (Encyclopedia Britannica.)

The "Hue and Cry" gives the following occupations for 112 *Karawe* members listed: coolies 51, cultivators 18, carpenters 16, traders 9, fishermen 9, and carters 9.

According to the census the Sinhalese fishermen numbered 10,414 in 1881, 35,367 in 1891, and 38,504 in 1901. In the "Hue and Cry" records of crimes charged to 149 *Karawe*, we find the following figures: theft and housebreaking 67, causing hurt 32, criminal breach of trust 15, robbery 14, murder 9, assault 6, and escaping custody 6.

The Fisher caste is subdivided into about 17 groups, as follows: (1) Animal-trap-makers, *Ugulwadi* (Bennett and Pridham); (2) Archers, *Dunuwaayeli* (Bennett and Pridham); (3) Ax fishers or Timber-fellers, *Porawakkara Karaway* (De Saram); (4) Bird-catchers, *Paksi* or *Pakai wadi* (Bennett and Pridham); (5) Bird-snarers, *Williya* (Bennett and Pridham); (6) Boat-fishers or Skate fishers, *Oru Karaway* (De Saram) or *Moru-karawo* (Valentyn); (7) Crocodile-fishers, *Kayman wadi* (Bennett and Pridham); (8) Date-flower fishers, *Indimal Kewulu* (De Saram) or *Indimal-keulo* (line-makers and net-makers—Valentyn); (9) Executioners, *Wadekayo* (Bennett and Pridham); (10) Fishmongers, *Maswikunanno* (Bennett and Pridham); (11) Hook-and-line anglers, *Kaywulo* (Bennett and Pridham); (12) Madel-net fishers or red-sail fishers, *Madel Karaway* (De Saram) or *Kadul-karawo* (Valentyn); (13) Net fishers in the sea, *Muhududaye* or *Meehududaye wadi* (Bennett and Pridham) and *Baroodel Karaway* (De Saram) or *Barudel-karawo* (Fishers who do not use casting nets—Valentyn); (14) Rivermouth fishers, *Gode kewuloo* (Fishers from land—De Saram) or *Godo-keulo* (Valentyn); (15) Rod fishers with bamboo, *Dandoo Karaway* (De Saram) or *Dandukarawo* (Valentyn); (16) Tok fishers, *Tok Kewuloo* (De Saram) or *Tock-keulo* (Fishers in fresh water—Valentyn); and (17) Turtle- or Tortoise-fishers, *Kesbakaraway* (De Saram) or *Kespe-karawo* (Valentyn). According to De Saram numbers (3), (14), (16), and (8) were low in status and did not intermarry with the rest. Similarly, Valentyn lists (16), (14), and (8) as of low status and not intermarriageable with the others. There are some indications that (11) and (16) may be identical groups. There are also evidences of two distinct classifications, with Valentyn and De Saram agreeing fairly closely as against Bennett and Pridham.

GRASS-CUTTERS

The term *Pannayo* is generally applied to the Grass-cutter caste and is derived from the word *pan*, a name for a species of high grass that they cut. This caste is also called *Jana Capanno*, or grass-cutters, because they cut fodder for horses and gathered leaves and branches for elephants. (Upham, vol. 3, pp. 347–348.)

This was a numerous group, and the services they rendered in return for their land tenures included the care of the royal cattle, and elephants, and the horses, as well as the furnishing of vegetables for the king's stores every fortnight. (Pridham, vol. 1, p. 240; Davy, p. 127.)

They also wove grass mats (*peduru*) out of various grasses and palm leaves and manufactured baskets and betel pouches. They employed a grass knife making their baskets of cane or rattan (*Calamus roxburghi*) and dyeing them red. Mats were provided for royal use when required. (Coomaraswamy, p. 240; Pridham, vol. 1, p. 240.)

In 1881 the census recorded 104 grass cutters and in 1891 listed 918.

JAGGERY-MAKERS

The manufacturers of sugar from palm juices were quite a distinctive caste. According to Upham (vol. 3, p. 347) they are called *Kandey Etto*, or Kandians, because of their residence in the Kandian highlands; *Sangarammu*, or defender of the priests' gardens (also interpreted as cohabitors with sisters or with own blood); and *Sakuro* or *Pakuro*, stone-makers because of the hard cakes of sugar or jaggery they produced. Frequently heard in modern times are the terms *Hakuru* and *Wahumpura*, or cook. According to Denham (p. 189) the honorific terms *Devayo* and *Vahum purayo* applied to this caste means workers in the kitchen. They were also called by the euphemistic name of *Kande-minissa*, or hillmen, because they were located primarily in the highlands.

In general the duties of this caste included sugar-making, cookery, palanquin-bearing, domestic service of various kinds, baggage-carrying, and agricultural activities. They were required to attend the manorial lords on journeys and to carry the palanquins of female members of the proprietor's family. When not engaged in domestic duties they supplied jaggery and vegetables, attended agricultural duties, or carried baggage. One-half share of the toddy (*Kitulanda-Mure*) of all kitul palms tapped was due to the proprietor. The toddy was converted into sugar by the *Hakuru*. This caste furnished the *Goigama* with cooks and were a fairly numerous group. The *Hinnevo* washed for them and they were excluded from the use of white linen. (A. A. Perera, App. p. xxii, uses the name *Wahumpuraya* for them; see also Upham, vol. 3, p. 347; Pridham, vol. 1, pp. 239–240; Davy, p. 127.)

The Sinhalese jaggery-workers numbered 303 in 1881, 1,990 in 1891, and 12,413 in 1901. The chief *Hakuru* occupation in the "Hue and Cry" records was agriculture, while the chief *Wahumpura* pursuits were coolie labor and agriculture, with small numbers serving as carters and masons.

LEATHER-WORKERS

The Leather-workers (Tanners) and the Shoemakers appear to have been one and the same caste. Following Upham's account (vol. 3, p. 344), the principal terms employed for this group were *Chammakarayo* (Chamars?), i.e., skin dressers; *Rattakarayo*, i.e., carriage makers in reference to the manufacture of harness for chariots and carriages; *Samwaduwo*, or skin carpenters; and *Sammahanno*, or shoemakers. The common terms *Sommaru* and *Hommaru* were employed to designate leather-workers. According to Bennett (p. 365) this caste was one of the *Pass mehe Karayo* or five performers of services along with carpenters, weavers, washermen, and barbers. The standing of Leather-workers is fairly good among Sudra groups. The Janavamsa includes them as one of the five servants along with smiths, tailors, washers, and barbers.

LIME-BURNERS

The caste of Lime-burners has been designated by a variety of names. According to Upham's account (vol. 3, p. 347) the principal ones were *Chunna-karayo* (reducers to powder, i.e., by burning stones, shells, and trees), *Sunno*, and *Hunno*. Denham (p. 190) asserts that the *Hunno*, or Lime-burners, may be addressed as *Panividakaraya* or *Payunda*, literally a messenger. He believes that persons of this caste may have been formerly employed as messengers or that perhaps the term arose from a designation for a minor headman. The terms *Chunam* burner and *Chinambero* were also used for them. According to Bennett (p. 566) the *Hunno* or *Chunam* makers were of the *Tolil Karayo* or particular services, along with the Tailors, Cooks, Tom-tom-beaters, and Palanquin-bearers. In general, the Lime-burners were given a low status among the Sudra castes, and according to Davy they were rather few in numbers. (See also Pridham, vol. 1, p. 240.)

The headmen of the Lime-burners were called *Hunudewea* and usually were engaged in plastering walls or superintending others of their caste. In olden times these persons whitewashed the house of the manorial lord once or twice a week. They also furnished purified lime for chewing with the areca nut and betel leaf. The *Deccum carao* of this caste paid an annual poll tax to the Kandian king and were required to keep up the lime furnace, to supply fuel, and to attend until the process was finished. They did not have the privilege of wearing white linen, and the *Pallys* washed for them. The *Huno kattanno* were employed in felling trees in the woods and in providing fuel for the lime kilns. (Upham, vol. 3, p. 347.)

According to the Ceylon census of occupations in 1881, there were 785 Sinhalese Lime-burners, in 1891 some 2,092, and in 1901 about 870. The Lime-burners in the "Hue and Cry" records were primarily coolies and masons.

MAT-WEAVERS

The following terms are used for Mat-weavers, according to Upham (vol. 3, pp. 350–351): *Pannakarayo*, i.e., leaf-workers,

referring to the weaving of various kinds of leaves; *Cattakarayo*, i.e, workers in hard matter or wood, because they pound on tree fibers until these are reduced to a pulp or wooly substance, which they use to make mats; *Tinakarayo*, i.e., workers in grass, because they make some kinds of grass into mats, and this by a transposition of consonants becomes *Kinnaru*, grass-workers; and *Hainawalaya*, i.e., fringe-makers because some mats are made with fringed selvedges. According to Denham (p. 190) the honorific term *Karmantakaraya*, or workmen, was applied to this caste.

Under the Kandian regime the *Kinnaru* were not allowed to wear any head covering or handkerchief. They were required to pay a *deccum* or poll tax and in virtue of this were called *Hiene Jaty*. They were regarded as a very low caste and were rather small in numbers. Their function was to furnish the royal stores with ropes and rush mats. They also wove cane baskets, made fans for fanning corn, and manufactured lace bedsteads and stools. The Dumbara mats were made of *niyanda* fibers (bowstring hemp or *Sanseveria zeylanica*). (Pridham, vol. 1, p. 241; Coomaraswamy, p. 243, gives examples of their work songs; Valentyn, *in* Philalethes, p. 331, gives the term *Hiene Jaty;* Parker, 1917, p. 30; Parker, pp. 44–45, 563–566.)

The *Kinnaru* were considered semi-outcastes of slightly higher position than the *Rodias*. The men were forbidden to grow hair beyond their necks, and the females from wearing anything more than a narrow strip of cloth above the waist to cover their breasts. Mat-weavers were absolutely forbidden to enter temples or sacred enclosures. Like the *Rodias*, they had their own doctors, astrologers, soothsayers, and officials for demon ceremonies. (Parker, 1917, p. 30; A. A. Perera, p. 337.)

According to the census, Sinhalese caneworkers numbered 40 in 1881, 363 in 1891, and 438 in 1901.

(To be concluded.)

PALEOBOTANY.—*The Lower Eocene flora of southeastern North America.*[1] EDWARD W. BERRY, Johns Hopkins University.

The Lower Eocene flora of southeastern North America comprises what is probably the most extensive fossil flora known from a single horizon in the world's Tertiary. It consists of several hundred nominal species —the precise number is immaterial, coming from 132 localities scattered along the shores of the Wilcox embayment through Alabama, Mississippi, Tennessee, Kentucky, Illinois, Arkansas, Louisiana, and Texas. I said the exact number of species is immaterial and I designated the species as nominal because it is a sound paleobotanical principle that in describing any fossil assemblage, where gradations between variants are not preserved or discovered, the new forms should be carefully described as new species. Hence, in all good paleontologic work there are probably more species described than actually existed. It is a sound method for a refined analysis to precede an attempted synthesis.

In a recent number of this JOURNAL[2] four Wilcox species and others inferentially are combined in three new generic assignments. It is these three generic assignments that invite comment. It is far from my purpose to become a knight errant in defense either of my own or of Knowlton's determinations, and I suspect that most readers have slight, if any, interest in the problem, but inasmuch as certain fundamental questions of paleobotanical practice are involved I feel constrained to review them. The first involves a form named *Diospyros asper* and thought to be a concrescent calyx compared with that of the living Asiatic *D. lanceolata* Roxburgh and with the fossil *D. rugosa* Saporta. Brown states in the article cited that these comparisons "fail to be convincing," and he therefore transfers the *Diospyros* to the genus *Fagus* and suggests that *Dryophyllum tennesseensis* Berry, a wide-

[1] Received December 20, 1944.

[2] BROWN, R. W. *Temperate species in the Eocene flora of the southeastern United States.* This JOURNAL 34: 349–351. 1944.

spread and very common leaf in the Wilcox, represents the leaves of this *Fagus*, of which the *Diospyros* calyces are regarded as the burs. Neither of these suggestions appeals to me as convincing, but there is more to be said.

These supposed burs have been found only at a single locality in Tennessee, and the *Dryophyllum* leaves have been found abundantly at 38 plant localities in five states and at none of these localities have the supposed burs been detected. Brown may, of course, be right. *Fagus* and the scarcely distinguishable *Nothofagus* are found in beds of this general age in various antipodeal regions and are considered to have had ancestors in the Northern Hemisphere, a fact that invalidates any argument against the presence of *Fagus* in as low a latitude as Tennessee at this time. By the same token it precludes the possibility of *Dryophyllum* representing a *Fagus* leaf.

Fagus burs are carried greater distances by natural means than are the leaves, and if, as Brown's hypothesis has it, this Wilcox material was brought into the basin of sedimentation from uplands with a cooler climate than that of the coastal Wilcox strip, these "burs" would be expected to be more abundant than the leaves. They are objects that would scarcely fail of detection, and it is strange that they have not been found at any of the 132 plant localities. Moreover, there is evidence that the eastern United States in Eocene time was a region of low relief and mature topography, and the fact that a considerable number of Wilcox species are identical with forms found in the contemporaneous lignites of Brandon, Vt., suggests that there was a general amelioration of climate, not only in eastern North America but in other parts of the world, notably shown in southern England.

The second species is called *Sassafras suspectum* and is based on certain leaves of *Sterculia wilcoxensis* found by me at Pine Top, Tenn. Although opinions may legitimately differ as to the propriety of associating the Pine Top specimens with the other occurrences of this species, I see no basis for referring them to *Sassafras*. Back in 1902 I made a study of the leaves of the living *Sassafras*[3] based on what was probably the largest collection ever made, and so there is presumably some actual basis for a judgment. The Wilcox leaves in question are too large to be those of a *Sassafras;* they have a different texture, which is hard to define in words but unmistakable to the trained observer; they do have the marginal hem in the sinuses, but this is also a feature of *Artocarpus* and other unrelated genera; they lack the characteristic venation of the basal triangle.

The chief point I want to make is that students should refrain from making changes unless they have facts as a basis rather than opinions. For example, I have long been of the opinion that some of the Wilcox leaves that are referred to *Ficus mississippiensis* really represent the genus *Hernandia*, but I certainly would not suggest such a change unless I had something more valid than a hunch with which to proceed, even though the genus *Ficus* is not very convincing. Another example is a statement (made, to be sure, when the author was inexperienced and afterward regretted by him) in the first volume of the late A. C. Seward's *Fossil plants*, where he implied that the paleobotanist could not differentiate between *Restio* (a monocotyledon), *Equisetum* (a lepidophyte), *Casuarina* (a dicotyledon), and *Ephedra* (a gymnosperm). The convergence in habit of these four is quite beside the point, since never in earth history have all four grown together or would they ever occur in the same deposit or ecological assemblage.

The third questionable proposal is to unite *Euonymus splendens* Berry and *Hicoria crescentia* Knowlton, to constitute a new species of *Staphylea*. The latter genus has trifoliate or pinnate leaves of moderate size with serrate margins and with the lateral leaflets sessile or subsessile. The fossils average 100 percent larger, are much more broadly ovate, and have acuminate tips and dentate margins. The petioles are long even in the minimum-sized specimens.

Waiving the question of whether the Wilcox leaves determined as *Hicoria cres-*

[3] Bot. Gaz. 34: 426–450. 1902.

centia are identical with Knowlton's type from the West, they seem to me to differ from *Euonymus splendens*, and here again the *Euonymus* is abundant at 31 widely scattered localities at not one of which, or any other of the 132 plant localities, has a seed or the characteristic inflated fruits of *Staphylea* been found, the sort of a fruit admirably adapted for preservation had it been in existence anywhere in the general region.

In closing, may I again disclaim any feeling of proprietary interest or chivalry in defending the species discussed, but I do feel strongly that if science is not to become a joke its votaries must refrain from making changes in which opinions and not facts are allowed to assume so leading a role.

ENTOMOLOGY.—*Five new flea beetles from the West Indies.*[1] DORIS H. BLAKE. (Communicated by S. F. BLAKE.)

The following species of flea beetles, with one exception, were collected by P. J. Darlington, Jr., and were found in unidentified material at the Museum of Comparative Zoology, Cambridge, Mass.

Genus Hadropoda Suffrian

Hadropoda albicincta n. sp.

Fig. 4

About 3 mm long, reddish brown with piceous head and prothorax and dark, somewhat metallic markings on elytra and body beneath; covered with golden appressed pubescence not concealing the dense punctation of the head and prothorax and large striate punctures of the elytra. Elytra considerably wider than prothorax and with numerous dark spots, the ones nearest the suture raised to form warty swellings, also a hump at the apical narrowing. Antennae short, with greatly enlarged apical joints, fifth and sixth conspicuously white.

Head with interocular space more than half its width, piceous, densely and roughly punctate, with fine, short, appressed pubescence; frontal tubercles not very distinct, interantennal area not produced, lower front short. Antennae extending below humeri, the five apical joints darker and much wider than the basal ones, fifth and sixth joints conspicuously white. Prothorax with sides nearly straight, only slightly curved, with a nodule at each corner, densely punctate, covered with short, appressed pubescence, surface uneven with two sharp median elevations slightly before the middle and a shorter one below and between them; piceous with basal margin paler. Scutellum covered with golden pubescence. Elytra considerably wider than prothorax, fairly convex, deep reddish brown with a darker area at base and along the sides, and dark spots, the spots in the line nearest suture raised to form warty elevations, one on the callosity near the scutellum, one before and one after the middle, and a swollen area on the side at the apical narrowing, other less prominent spots along the sides, these not raised, about all these spots the pubescence arranged in a sort of circular whirl; a deep incurving sulcus running from within the humerus about the basal callosity nearly to the suture. Striate punctation large and deep. Body beneath deep reddish brown, shining, with pale pubescence, basal half of anterior femora pale, hind femora on back densely pubescent with dark median band. Anterior claws exceptionally large, and with a basal tooth; hind claws swollen. Length 3 mm, width 1.4 mm.

Type female, Mus. Comp. Zool. 26925.

Type locality.—Morne La Hotte, elevation 5,000–7,800 feet, Haiti, collected October 16, 17, 1934, by P. J. Darlington.

This species belongs to the same group as *Hadropoda barberi* and *hugonis*, the former from Puerto Rico, the latter from the Dominican Republic. Together they form a group that stands a little apart in the genus and resembles in many ways the species of the North American genus *Distigmoptera*. *H. albicincta* closely resembles *hugonis* but differs in having raised sutural margins and three warts as well as an apical tumidity on each elytron. Its elytral punctation is a little finer and the whole beetle slightly more slender. All three species are peculiar in having a white fifth, and in this species also a white sixth, antennal joint.

[1] Received January 5, 1945.

Genus **Oedionychis** Latreille

Oedionychis pseudothoracica, n. sp.

Fig. 5

About 6 mm long, oval, not very shiny, densely and coarsely punctate; head, prothorax, abdomen, coxae, and middle of breast yellow, antennae, legs, and rest of undersurface and five spots on pronotum dark brown, elytra blue-violet.

Head densely and rugosely punctate, the tubercles distinct, area between antennae slightly produced; interocular space approximately half the width of head; yellow-brown with dark mouthparts, slightly darkened tubercles, a spot on occiput and margin about eyes darker. Antennae rather heavy, extending to the middle of elytra, entirely dark brown, joints 3, 4, and 5 long and about equal. Prothorax at base twice as wide as long, narrowed anteriorly with the explanate margin becoming wider and slightly produced; disk covered with coarse and moderately dense punctures, yellow with five piceous spots. Scutellum black and shiny. Elytra smoothly convex, slightly wider posteriorly, with a narrow margin; intrahumeral depression short and not marked, sutural edges smooth, a little raised, surface more densely punctate than prothorax, deep violet-blue. Body beneath very sparsely pubescent, legs and metasternum shining with a faint metallic lustre, prosternum, middle of metasternum, coxae and abdomen pale. Length 5.7 mm, width 3 mm.

Type male, U.S.N.M. 57228.

Type locality.—Camagüey, Cuba, collected July 30, 1923, by J. Acuña.

Superficially this species resembles the North American *Oedionychis thoracica* Fabricius in markings and coloration. It belongs, however, to the group with the front of the head produced and the eyes rather closely set. It also has fewer pronotal spots than are found in *O. thoracica.*

Genus **Pseudoepitrix** Jacoby

Pseudoepitrix tetraspilota, n. sp.

Fig. 1

About 2.5 mm long, shining, reddish brown with four darker brown elytral spots, two at base and two in middle, and a dark abdomen; the striate elytral punctures distinct to the apex.

Head with interocular space half its width, frontal tubercles not distinctly marked, a depression behind running up to fovea by the eye, lower front of head long and gradually narrowing to labrum, distance from top of labrum to antennal sockets approximately equal to width between the eyes; occiput alutaceous and with a circle of fine punctures in the middle; head reddish brown, a little darker on top. Antennae extending to the middle of the elytra, gradually deepening in color, fifth joint long. Prothorax about a fourth wider than long, widest anteriorly, narrowed slightly to a prominent basal nodule, sides straight; basal margin somewhat sinuate; disk with a deep basal sulcus, punctation moderately dense and distinct. Scutellum deep reddish brown. Elytra shining, a distinct callosity at base near the suture and a well marked intrahumeral depression extending around and below it; on this callosity a deepening in coloration, a similar dark area in the middle of each elytron, these dark areas more or less conspicuous in four of the five specimens examined, in one only traces of the spots. Striate punctures distinct to the apex. Body beneath polished yellow brown, the abdomen, except for the pale tip, deep reddish brown. Length 2.3–2.6 mm, width 1.2–1.3 mm.

Type male, Mus. Comp. Zool. 26922. Four paratypes, two males, two females, a pair of these in National collection, U.S.N.M. 57229.

Type locality.—Pico Turquino, 5,000–6,000 feet elevation, Cuba, collected in June 1936 by P. J. Darlington.

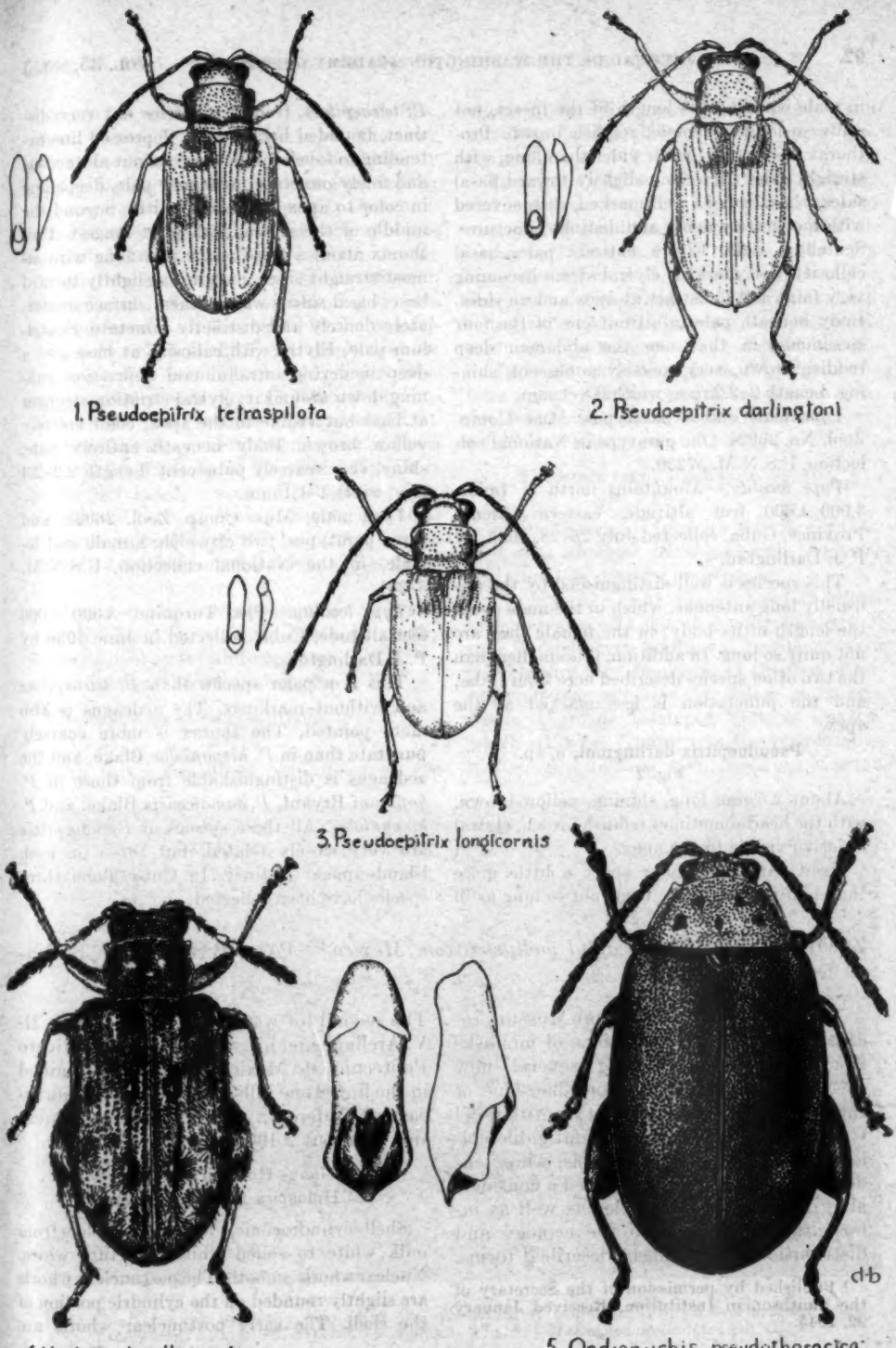
This is the first species of the genus to be described from Cuba and the first spotted species known in the genus.

Pseudoepitrix longicornis, n. sp.

Fig. 3

About 2 mm long, shining, pale yellow-brown with slightly darker head and antennae, antennae in male approximately equal to length of beetle; elytral striae poorly marked toward apex of elytra.

Head with interocular space a little more than half width of head, lower front tapering, giving head a triangular shape in front, occiput alutaceous, very finely punctate on vertex, a depressed line running behind tubercles to fovea at margin of eyes. Antennae very long,



FIGS. 1–5.—Five New Species of Flea Beetles.

in male equaling the length of the insect, not quite so long in female, reddish brown. Prothorax less than a fourth wider than long, with straight sides narrowing slightly toward basal sulcus, basal sulcus well marked, disk covered with moderately dense and distinct punctures. Scutellum pale. Elytra entirely pale, basal callosity well marked, elytral striae becoming very faint and indistinct at apex and on sides. Body beneath pale in all but one of the four specimens, in that one the abdomen deep reddish brown, very sparsely pubescent, shining. Length 2–2.2 mm; width 0.8–1 mm.

Type male and 3 paratypes, Mus. Comp. Zool. No. 26924. One paratype in National collection, U.S.N.M. 57230.

Type locality.—Mountains north of Imias, 3,000–4,000 feet altitude, eastern Oriente Province, Cuba, collected July 25–28, 1936, by P. J. Darlington.

This species is well distinguished by the unusually long antennae, which in the male equal the length of its body; in the female they are not quite so long. In addition, it is smaller than the two other species described here from Cuba, and the punctation is less marked at the apex.

Pseudoepitrix darlingtoni, n. sp.
Fig. 2

About 2.5 mm long, shining, yellow-brown, with the head sometimes reddish brown, elytral striation visible to the apex.

Head with interocular space a little more than half its width, the front not so long as in *P. tetraspilota*, frontal tubercles not very distinct, bounded behind by a depressed line extending to fovea by the eye; occiput alutaceous and finely punctate. Antennae pale, deepening in color to apex, extending a little beyond the middle of the elytra, fifth joint longest. Prothorax about a third wider than long with almost straight sides, narrowing slightly toward base, basal sulcus well marked, surface moderately densely and distinctly punctate. Scutellum pale. Elytra with callosity at base and a deep incurving intrahumeral depression running down around it; elytral striation stronger at base but visible to the apex; color entirely yellow brown. Body beneath entirely pale, shiny, very sparsely pubescent. Length 2.2–2.4 mm; width 1–1.1 mm.

Type male, Mus. Comp. Zool. 26923, and three paratypes, two of which, a male and female, in the National collection, U.S.N.M. 57231.

Type locality.—Pico Turquino, 3,000–6,000 feet altitude, Cuba, collected in June 1936 by P. J. Darlington.

This is a paler species than *P. tetraspilota* and without markings. The aedeagus is also more pointed. The thorax is more coarsely punctate than in *P. hispaniolae* Blake, and the aedeagus is distinguishable from those of *P. hoffmani* Bryant, *P. jamaicensis* Blake, and *P. hispaniolae*. All these species of *Pseudoepitrix* are very closely related, but those on each island appear distinct. In Cuba alone three species have been collected.

ZOOLOGY.—*New urocoptid mollusks from Mexico.*[1] PAUL BARTSCH, U. S. National Museum.

The United States National Museum recently received two collections of mollusks from Mexico representing several new species of the family Urocoptidae. One of these collections was made at Teotitlán del Camino, Oaxaca, by the indefatigable collector Miss Marie E. Bourgeois, whose endeavors in the past have yielded a considerable number of new species as well as information pertaining to the ecology and distribution of previously described forms.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received January 22, 1945.

The second lot was collected by Ing. A. R. V. Arellano and his students of the Instituto Politécnico de México. They were obtained in the limestone hills 10–30 km north-northeast of Cadereyta, Querétaro, at an elevation of about 2,100 meters.

Genus **Holospira** Martens
Holospira teotitlana, n. sp.

Shell cylindroconic, varying in color from milk white to soiled white; aperture white. Nuclear whorls smooth. The postnuclear whorls are slightly rounded on the cylindric portion of the shell. The early postnuclear whorls are

marked by weak, closely spaced axial ribs, which become less well defined on the later turns where they are also a little more distantly spaced. On the last whorl they become heavier and even more distantly spaced. Base well rounded with a well-impressed umbilicus. Aperture subcircular with a slight angulation at the posterior angle. Peristome white and reflected. The columella is slender and hollow and bears a strong lamella on the middle in the penultimate turn, which is thick and rounded at its free edge. The parietal lamella is broad, concave on the outside, and slightly outward reflected. The basal lamella is less strongly developed than the parietal lamella and occupies the middle of the base. The labial lamella is poorly developed, consisting of a mere heavy thread. All three of these elements find their greatest expression in the penultimate turn, scarcely extending beyond this in either direction.

This species somewhat resembles *Holospira nelsoni* Pilsbry, from which it can be readily distinguished by its white aperture.

I am recognizing two subspecies.

Holospira teotitlana teotitlana, n. subsp.
Fig. 2

This subspecies differs from *Holospira teotitlana filia* in being smaller, more slender, and with the axial sculpture a little more pronounced.

The type, U.S.N.M. 431954, has 12.5 whorls and measures: Height, 17 mm; diameter, 5.5 mm. It and 27 additional specimens were collected by Miss Bourgeois under rocks of a small circular foothill at the foot of the higher sierra called Cerro Blanco or Cerro de Tizatepec at Teotitlán del Camino, Oaxaca. Seventeen topotypes are entered as U.S.N.M. 431955.

U.S.N.M. 431956 contains five specimens from a nearby locality, and five additional specimens from the same lot are in Miss Bourgeois's collection.

Holospira teotitlana filia, n. subsp.
Fig. 1

This subspecies is in every way larger than *Holospira teotitlana teotitlana*, with the axial sculpture less strongly pronounced.

The type, U.S.N.M. 431957, has 13.2 whorls and measures: Height, 19.4 mm; diameter, 6 mm. It and seven additional specimens were collected by Miss Bourgeois at the foot of another circular hill near the village of Ignacio Mejia, Cerro de Tizatepec, State of Oaxaca, which is 10 km distant from the type locality of *Holospira teotitlana teotitlana*. Four of seven

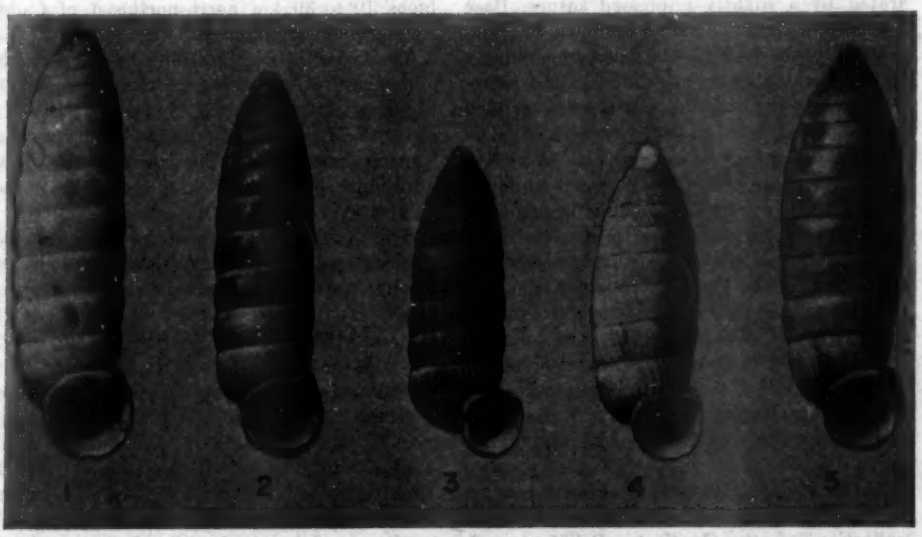


FIG. 1.—*Holospira teotitlana filia.* FIG. 2.—*Holospira t. teotitlana.* FIG. 3.—*Malinchea queretaroensis.* FIG. 4.—*Malinchea politecnicae.* FIG. 5.—*Malinchea arellanoi.* (All ×3¼.)

specimens are entered as U.S.N.M. 431958; three are in Miss Bourgeois's collection.

Malinchea, new name

Tristemma Bartsch, Proc. U. S. Nat. Mus. 31: 133. 1906. (Not *Tristemma* Brandt, Prod. Anim. Mertens 1: 15. 1835.)

When I defined the genus *Tristemma* in 1906 I overlooked Brandt's previous use of this name. I am therefore rechristening the group as above.

Malinchea arellanoi, n. sp.
Fig. 5

Shell cylindroconic, bluish white, marked with a few feeble rust spots; interior of aperture and peristome white. The nucleus forms a slightly bulbous apex, which consists of 2.2 well-rounded, smooth turns. The early postnuclear whorls increase rapidly in size and are marked by well-developed, retractively slanting axial ribs, which are about half as wide as the spaces that separate them. These ribs vary somewhat in strength and spacing. On the succeeding whorls the axial ribs rapidly become diminished and completely disappear on the cylindric portion of the shell. On the last 1.5 turns, however, they recur and become very strong and almost vertical. The whorls on the cylindric portion are almost flattened and separated by a slightly impressed suture. Base moderately long, openly umbilicated, and marked by the axial riblets. Aperture obliquely broadly oval, slightly angulated at the posterior angle of the aperture. Peristome expanded and reflected, free at the parietal wall. The columella is rather broad and hollow, and in the penultimate whorl it bears a well-developed median lamellar fold. A broad, somewhat concave fold subtends from the parietal wall, while another a little less strong is present on the middle of the base. There is no indication of a fold or thread on the inside of the outer lip.

The type, U.S.N.M. 431959, was collected by Ing. A. R. V. Arellano and his students on a limestone hill 10 to 30 km north-northeast of Cadereyta, Querétaro, Mexico. It has 14.4 whorls and measures: Height, 18.3 mm; diameter, 7 mm.

U.S.N.M. 431960 contains seven topotypes from the same source; three more are in the collection of the Instituto Politécnico de México.

Malinchea politecnicae, n. sp.
Fig. 4

Shell rather small, cylindroconic, white with the peristome and the interior of the aperture yellowish white. The nucleus consists of about 2.2 whorls, which form a somewhat bulbous smooth apex. The early postnuclear whorls are marked by retractively curved, strong, axial ribs, which are separated by spaces a little wider than the ribs. The middle whorls are almost flattened and marked by strong incremental lines amounting almost to ribs, while the last two turns bear very strong, almost vertical, curved axial ribs, which are not quite so wide as the spaces that separate them. The suture is slightly impressed. The base of the last turn is narrowly openly umbilicated and marked by the continuation of the axial ribs. The aperture is irregularly ovate, angulated at the posterior angle. The peristome is expanded and reflected, free, and elevated at the parietal wall. The columella is rather broad and bears a strong median fold in the penultimate turn. Here also on the parietal wall is a moderately broad, concave lamella, while the basal wall in the same region bears a less elevated lamella. There is no sign of a lamella or thread on the inside of the outer lip.

This species comes from another limestone block 10 to 30 km north-northeast of Cadereyta, Querétaro, Mexico.

The type, U.S.N.M. 431961 has 12.2 whorls and measures: Height, 14.6 mm; diameter, 6 mm.

U.S.N.M. 431962 contains 12 topotypes and some fragments from the same locality. Five additional specimens are in the collection of the Instituto Politécnico.

This species resembles *Malinchea areallanoi* but can readily be distinguished from it by its smaller size and stronger axial sculpture.

Malinchea queretaroensis, n. sp.
Fig. 3

Shell small, cylindroconic, yellowish white, with the interior of the aperture and peristome pale yellowish white. The nucleus consists of 2.3 well-rounded, smooth turns which form a slightly bulbous apex. The early postnuclear whorls increase rapidly in size. These, as well as the rest of the whorls of the shell, are marked by strong, retractively slanting axial ribs,

which are almost sublamellose. The spaces separating these ribs vary from twice to three times the width of the ribs. Suture moderately constricted. Base of the last whorl short, rather widely openly umbilicated and marked by the continuation of the axial ribs. Aperture subquadrate. Peristome expanded and reflected; that of the parietal wall free. Columella rather broad. In the penultimate turns this bears a moderately strong fold, which is anterior to the middle. The parietal fold is very broad and lamellose and extends in its widest portion over more than half of the width of the whorls. The basal fold, on the other hand, is rather low when compared with the parietal fold. There is no indication of a fold or thread on the inside of the outer lip.

The type U.S.N.M. 431963, was collected by Ing. A. R. V. Arellano and his students on a limestone hill 10 to 30 km north-northeast of Cadereyta, Querétaro, Mexico. It has 13.5 whorls and measures: Height, 14.2 mm; diameter, 5.7 mm.

ICHTHYOLOGY.—*The discovery and redescription of the types of* Rivulus marmoratus *Poey, a cyprinodont fish from Cuba.*[1]

LUIS RENÉ RIVAS, Museo de Historia Natural, Colegio de La Salle, Habana, Cuba. (Communicated by LEONARD P. SCHULTZ.)

While recently examining material of *Rivulus* in the United States National Museum, Dr. Leonard P. Schultz, curator of fishes, kindly called to my attention two specimens of Poey's, long ago labeled *Rivulus cylindraceus* Poey, and suggested that they were possibly a new species, since no fine-scaled *Rivulus* was recognized from Cuba by any current author. After careful examination of several facts and from circumstantial evidence, I am convinced that the two specimens are the types of *Rivulus marmoratus* Poey (1880: 248), and I submit the evidence below.

I wish to thank Dr. Schultz for calling these two specimens to my attention and am grateful for the opportunity to report on this Cuban fish, which has never been correctly diagnosed.

Rivulus cylindraceus Poey (1860: 308) was described first and is a coarse-scaled species that cannot be confused with the two fine-scaled specimens at hand. Furthermore, the types of *R. cylindraceus* are deposited in the Museum of Comparative Zoology; the holotype is a female bearing M.C.Z. No. 6423, a male paratype being in the same jar. There is another series of paratypes bearing M.C.Z. No. 6395 (see Luis Howell-Rivero, 1938: 176). I have examined these specimens and they agree with Poey's original description of *R. cylindraceus*. In addition, I have collected a fine series of topotypes that agree perfectly with Poey's description. Thus I have concluded that there can be no doubt cast on the current diagnosis of this species.

Poey's original description of *Rivulus marmoratus*, translated into English, reads as follows: "I have in my possession two specimens which I believe I have received from Dr. Rafael Arango; and they are from Cuba, if they do not exist in the United States of America, whence Professor Gill has sent me some species of *Cyprinodontes*. The ocular blotch indicates that they are males; they are 55 millimeters long.

"It differs from the preceding species [*Rivulus cylindraceus* Poey] in the more posteriorly inserted dorsal, because its distance to the caudal extremity equals that of said dorsal to the opercle, which is why the anal appears more advanced. The body is covered with dark and light blotches. A black blotch is noticed above the base of the pectoral fin.—No. 774."

This description by Poey fits exactly the two specimens under consideration, even in regard to the total length of about 55 mm. It is concluded that to have two of Poey's specimens of *Rivulus* 55 mm. in length in the same jar from Cuba is also additional evidence and especially significant. I believe, therefore that they are the two specimens described as *Rivulus marmoratus* Poey, and I recognize them as the types of that species.

[1] Received November 1, 1944.

Rivulus marmoratus, after examination of the pertinent literature, I conclude has been erroneously synonymized by most authors with *Rivulus cylindraceus* Poey (1860: 308), the only other Cuban representative of the genus, from which it differs widely. Jordan and Evermann (1896: 663) wrongly stated (footnote) that Poey was in error in indicating the existence of an ocellus above the pectoral origin. The ocellus, although somewhat faded after the long preservation, is present on both specimens, thus confirming Poey's description. Later, Myers (1927: 121) was in error in stating that Jordan and Evermann (l.c.) had mistaken the "anal" for the "dorsal" in Poey's original description of *Rivulus marmoratus*. A careful checking of Jordan and Evermann's account with Poey's description proves that these authors were correct in that respect.

The taxonomic status of this species and a redescription of the two types are given below.

Rivulus marmoratus Poey

Rivulus marmoratus Poey, 1880: 248 (original description; compared with *R. cylindraceus*).—Jordan, 1887: 564 (listed).—Garman, 1895: 134 (erroneously synonymized with *R. cylindraceus*).—Jordan and Evermann, 1896: 663 (description, after Poey),—Regan, 1912: 500 (erroneously synonymized with *R. cylindraceus*), —Myers, 1927: 121 (erroneously synonymized with *R. cylindraceus*),—Jordan, Evermann, and Clark, 1930: 179 (erroneously synonymized with *R. cylindraceus*).

I am designating as the lectotype U.S.N.M. 37429, a female 46.5 mm in standard length (56.5 mm total); the paratype, U.S.N.M. 123000, also a female, measures 45.5 mm in standard length (54.8 mm total).

Measurements are expressed in hundredths of the standard length. Throughout the description, the measurements and counts of the lectotype are given first, followed by those of the paratype in parentheses. For the methods followed in measuring and counting, see Rivas (1944: 41).

Greatest depth of body 19.8 (19.3); greatest width 18.3 (15.6); length of head 28.0 (27.3); greatest width 20.4 (19.1), greatest depth 14.2 (13.8); eye 6.7 (6.4); interorbital 12.7 (12.7); snout 8.2 (7.2); greatest width of mouth 11.2 (10.0); least depth of caudal peduncle 14.4 (13.8), length 21.5 (20.4); distance between anal origin and tip of mandible 61.7 (65.2).

Dorsal rays 8 (8); anal 10 (10); pectoral 13 (13); pelvic 6 (6); branched caudal 14 (14); origin of anal fin midway between caudal base and anterior margin of orbit in the lectotype; midway between caudal base and posterior margin of orbit in the paratype. Distance between dorsal and anal origins 21.1 (20.0); between dorsal origin and caudal base 26.9 (25.5); between anal origin and caudal base 36.8 (34.3); length of dorsal fin—19.6 (19.3); anal 24.1 (24.4); pectoral 24.1 (16.9); pelvic 6.9 (7.0); middle caudal rays 19.8 (18.9).

Scales in 48 (46) transverse rows and 14 (13) longitudinal rows; 18 (18) rows around caudal peduncle, and 15 (15) zigzag rows between pectoral bases; 35 (33) predorsal scales.

General coloration (in alcohol) reddish brown. A reddish-brown humeral spot (faded ocellus); both specimens have a dark spot (faded ocellus) on the upper part of the caudal base; there are faint traces of spotting on the dorsal, anal and caudal fins; pectoral and pelvic fins colorless; faint traces of spots all over the sides of the body.

This species differs from *R. cylindraceus* in the smaller scales (about 36 transverse rows in *cylindraceus*), smaller head, more advanced anal and other characters; the size seems to be larger. It resembles *R. hildebrandi* Myers (1927: 123) from Panama and *R. myersi* Hubbs (1936: 210) from Yucatán in having more than 42 transverse rows of scales. A direct comparison with these two species should be made.

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PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY

1221ST MEETING

The 1221st meeting was held in the Cosmos Club Auditorium, October 23, 1943, President SEEGER presiding.

Program: ROBERT SIMHA, Howard University: *Elasticity and flow in high polymers.*—The mechanical properties of high polymeric systems were considered in a state of equilibrium and in regard to rate phenomena such as creep, relaxation, volume-temperature, and volume pressure behavior. The characteristic differences between the molecular mechanism underlying elastic deformation in ordinary solids and in rubberlike polymers were discussed and conditions favorable for highly elastic response were pointed out. Creep was interpreted in terms of of a distribution of mechanical relaxation frequencies attributable roughly to three molecular mechanisms: the diffusion of chain segments in the field of stress, the change of shape of flexible chains under stress, and the relative displacement of the centers of gravity of the molecules which ultimately leads to flow. In a rubberlike system the relaxation spectrum is broad and the average time constant small. Oppression of "chain effects" by increased intensity of molecular interactions, excessive cross linking, or crystallization leads to a narrowing down of the spectrum and to an increase of the mean time parameter, as is characteristic for a plastic or fibrous material. The transition from ordinary to high elasticity upon increase in temperature was interpreted on the same basis as the transition points observed by means of thermal expansion and specific heat data and those to be expected in the volume-pressure curves. Finally the importance of mechanical absorption and dispersion measurements below and above the transition temperature was pointed out. (Author's abstract.)

1222D MEETING

The 1222d meeting was held in the Cosmos Club Auditorium, November 6, 1943, President SEEGER presiding.

Program: R. Weller, Naval Ordnance Laboratory: *Photoelasticity.* (Abstract not received.)

1223D MEETING

The 1223d meeting was held in the Cosmos Club Auditorium, November 20, 1943, President SEEGER presiding.

Program: L. B. TUCKERMAN, National Bureau of Standards: *Mathematics as she are taught: Fit the Second.—Part I:* Teachers of college physics have long recognized that if they are to inculcate correct ideas they must spend a large part of their time in eradicating many misconceptions about mathematics, physics, and science in general, which are firmly entrenched in their students' minds. In recent numbers of the American Journal of Physics[1] there are listed 158 current misconceptions. In discussing this problem Prof. Henry A. Perkins[2] says: "They originate in outworn notions whose vitality is perennial, in lack of clarity or in positive misstatements in text books and in previous faulty instruction."

A fruitful source of such faulty instruction was recently brought to my attention by a very favorable review of *A Source book of mathematical applications,* 17th Yearbook of the National Council of Teachers of Mathematics,

[1] Vol. 11: 101–102, 110–111, 164–165, 227–228. 1943.

[2] *L.c.*, p. 101.

published by the Bureau of Publications, Teachers College, Columbia University, New York, 1943, and planned as a "reference book for the teachers of the mathematics usually offered in grades seven through twelve."

It seems incredible, but it is unfortunately true, that in this book there is crowded more misinformation than I have ever seen within the covers of a single book issued by a supposedly reliable organization. It abounds in grossly careless proofreading, in careless checking of references, in confusion of units such as "knots per hour," "force" for energy, "watts consumed . . . in one hour," in careless statements and even in sheer asininities—boners which deserve to be immortalized in a book devoted to boners. Numerous quotations from the book were given as illustrations of these statements. Students have enough difficulty with mathematics as it is ordinarily given in schools without being further confused by the absurdities printed in this book.

Part II: Recently there appeared in my mail a flamboyant advertisement of the "National Educational *Alliance*" announcing a "vital new 180-day Emergency Short" . . . "*N.E.A.* Course in PRACTICAL MATHEMATICS" containing amongst a plethora of other eulogistic statements the following:

5. . . . No previous Mathematics Knowledge Needed . . . .

6. . . . ANY AVERAGE PERSON can readily acquire . . . .

Not in 4 Years, but Only 6 Months—a Practical Working Knowledge of ALL 14 Branches of Mathematics—Arithmetic, Algebra, Geometry, Trigonometry, Calculus, etc., and their Practical Applications to Machine Shop, Engineering, Chemistry, Electricity, Navigation, Aviation, Gunnery, Business, etc.

Many similar advertisements come in my mail. I usually glance at them and drop them in the waste basket, though I have called some of them to the attention of the Post Office and some to the Federal Trade Commission only to learn that they were so carefully worded that, although they were false and even fraudulent in their implications, under our present laws no action could lie against the advertisers.

This advertisement, however, I did not drop in the waste basket. My eye was caught by the words: *"No Single Faculty Ever Could Proclaim such a Distinguished Group of Mathematicians."* In the list of names following were two members of the National Academy of Sciences and nine other professors of mathematics in some of our largest universities and technical schools.

What sort of mathematics teaching can we expect when the names of such distinguished mathematicians appear as sponsors on such an advertisement? (*Author's abstract.*)

An informal communication on the measurement of temperature in moving aircraft was presented by Mr. BROMBACHER.

1224TH MEETING

The 1224th meeting, constituting the 74th annual meeting, was held in the Cosmos Club Auditorium, Saturday, December 4, 1943, President SEEGER presiding.

The Treasurer reported that the income from dues and from interest on investments was $1,196.99 and that the expenditures, other than investments, were $1,138.74, leaving a net surplus of $58.25 on ordinary expenses. The ordinary expenditures were at the rate of $3.55 per member. The Treasurer reported the sale of a $1,000 Bond of Fort Dodge, Des Moines & Southern Railway for $269.25.

The Secretaries' joint report showed an active membership as of December 1, 1943, of 321, of whom the following were new members: ARTHUR D. BERNSTEIN, RALPH MOORE BERRY, RICHARD S. BURINGTON, HOWARD F. CARL, DONALD H. JACOBS, PAUL J. KOPP, WALTER H. MACWILLIAMS, JR., ALBERT MAY, LAWSON M. MCKENZIE, ROBERT G. NUGENT, WILLIAM R. OSGOOD, ELIZABETH RONA, ANATOL J. SHNEIDER, SIDNEY T. SMITH, F. LEO TALBOTT, and HAROLD O. WYCKOFF. They reported the following deaths: ALAN S. HAWKESWORTH, JAMES E. IVES, G. W. LITTLEHALES, CHARLES F. MARVIN, and NATHAN S. OSBORNE.

Following the report of the Committee on Elections, the following officers were declared elected for the year 1944: President, H. F. STIMSON; Vice-Presidents, CLEMENT L. GARNER and GEORGE R. WAIT; Corresponding Secretary, WALTER RAMBERG; Treasurer, FRANCIS E. JOHNSTON; Members-at-Large of the General Committee, FRANK C. KRACEK and ALBERT K. LUDY.

Program: S. CHANDRASEKHAR, Yerkes Observatory: *Galactic evidences for the time scale of the universe.*—Galactic star clusters like the Pleiades and the statistics of double stars pro-

vide two independent sources of information for drawing inferences concerning the time scale of the universe.

Considering first star clusters, we can readily show that they are continually being impoverished by the gradual escape of stars. An estimate of this escape of stars will therefore provide a means for determining the average life of a star cluster. And it is found that the mean life of a cluster like the Pleiades is about 3×10^8 years.

With respect to binary stars, it is clear that as a consequence of the tidal effects of the neighboring stars, double stars should gradually tend to be disrupted. An estimate of this gradual dissolution of binary stars shows that binaries with separations between 1,000 and 10,000 astronomical units will be disrupted in times ranging from 7×10^{10} to 2×10^8 years. However, the number of known binaries in the range specified is far too large to be compatible with a time scale long compared to 3×10^8 years.

Thus both the star clusters and the binaries agree in indicating a time scale of 3×10^8 years. *(Author's abstract.)*

1225TH MEETING

The 1225th meeting was held in the Cosmos Club Auditorium, December 18, 1943, President STIMSON presiding.

Program: ATHERTON H. MEARS, Weather Bureau: *Electrical instruments for meteorological measurements.* (Abstract not received.)

An informal communication on paper folding, with a demonstration of the construction of the regular octahedron, was presented by Mr. GOLDBERG.

1226TH MEETING

The 1226th meeting was held in the Cosmos Club Auditorium, January 15, 1944, President STIMSON presiding.

The Retiring President, R. J. SEEGER, gave an address entitled *On understanding electric breakdown in solids.* It will be published in this JOURNAL.

1227TH MEETING

The 1227th meeting was held in the Cosmos Club Auditorium, January 29, 1944, President STIMSON presiding.

Program: E. H. KENNARD, Cornell University, and DAVID TAYLOR, Model Basin: *Why be scientific.*—A striking feature of the natural sciences, in contrast to the continual fluctuation of opinion in certain other fields, is the steady growth of a large body of well-established facts and laws. This feature is to be ascribed in part to the employment of a characteristic method. Neither the use of experiment, however, nor of measurements, nor of mathematics, nor of theories is essential; for, in spite of their enormous value, each of these procedures is absent in much scientific work. The basic unifying principle in all sciences appears to be the search, by any means available, for objective knowledge, that is, for conclusions acceptable to all honest and sane men who will take the trouble to inform themselves.

Two subsidiary universal procedures are the adequate definition of terms and a principle of restraint; problems that cannot as yet be attacked receive little emphasis or discussion.

Extension of the scientific method to other fields is going forward. The ultimate basis of values, however, lies in the realm of feeling and so is not a question of truth. Furthermore, scientists should be distinguished from practitioners, who are compelled to do something about practical problems even in the absence of relevant scientific knowledge. *(Author's abstract.)*

An informal communication on a curious and interesting little point in the theory of electric circuits was presented by Mr. OSGOOD.

1228TH MEETING

The 1228th meeting was held in the Cosmos Club Auditorium, February 12, 1944, President STIMSON presiding.

Program: RICHARD S. BURINGTON, Case School of Applied Science: *Invariance in science.*—This lecture was concerned with applications of the theory of invariance as it permeates various old and modern physical theories.

As an introduction, an elementary but brief survey of various types of geometries (translational, rotational, affine, projective), their groups of fundamental invariants, was given. Many illustrations from various fields of physics were included, both classical and modern.

Brief reference was made to the fundamental items of invariant theory in general, with mention of the case when the underlying transfor-

mations do not necessarily form a group. A short summary was given of the role of invariants in certain mathematical fields that appear in physics; in particular, brief mention was made of differential invariants, the existence of fundamental systems of invariants, the invariant characterization of boundary value problems and their relation to characteristic values and quadratic forms and their principal invariants.

The meaning and significance of invariants both in mathematics and in physical situations were stressed and carefully illustrated. In particular, to indicate the nature and role of invariants in a physical field, considerable use was made of the set of energy quadratic forms commonly considered in linear dynamics and electrical circuit theory, together with its principal invariants, under a group of m-affine transformations.

Specific mention was made of the trend of the concept of invariance in Newton's theory of the universe, Maxwell's theory of electrodynamics, and Einstein's special theory of relativity.

A short résumé of the part played by invariance in various other parts of physics, engineering, economics, and the medical and social sciences was included.

Some indication of the trend that theories of invariance may take in the future was discussed in a broad way. (*Author's abstract.*)

An informal communication on the origin of the Japanese Nation was presented by Mr. SHNEIDEROV.

1229TH MEETING

The 1229th meeting was held in the Cosmos Club Auditorium, February 26, 1944, President STIMSON presiding.

Program: RICHARD C. DARNELL, Office of the Chief of Ordnance, War Department: *The problem of antiaircraft fire control.*—Antiaircraft fire-control systems vary in complexity from the simplest for .50-caliber machine guns, the more elaborate for intermediate caliber weapons (37 and 40 mm material), to the most complex and precise for the major caliber guns, which comprise the 3 inch, 90 mm, 105 mm, and larger cannon.

A major caliber system will include sound locators or other devices for early warning and location of hostile aircraft, and searchlights for their illumination at night. These are placed some distance in advance of the gun battery. The present angular position in azimuth and elevation is determined by optical tracking of the target by the Director. A 13½-foot base optical height finder is used to measure either the slant range or height of the target. From these data the target's future position, after the interval required for the travel of the projectile, is calculated and corrections then applied for horizontal and vertical parallactic displacement of the guns, gravity drop, wind, drift, air density, and muzzle velocity. This solution is transmitted by a self-synchronous data transmission system to the guns, which are automatically oriented in aximuth and elevation by an electronic-hydraulic remote control device in accordance with the data received. A fuse setter cuts the mechanical timer fuse on the projectile so as to cause it to explode at the expiration of the computed time of flight. (*Author's abstract.*)

1230TH MEETING

The 1230th meeting was held in the Cosmos Club Auditorium, March 11, 1944, President STIMSON presiding.

Program: IRVEN TRAVIS, Bureau of Ordnance, Navy Department: *Differential analyzers.* (Abstract not received.) In the discussion Mr. SHNEIDEROV called attention to the existence of a paper, *A mechanical integrator for the solution of ordinary differential equations*, referring to an instrument designed by A. J. Zavrotzky, available at the Smithsonian Institution.

The Secretary read a letter from MARY G. WORTHLEY, of Western High School, on the the paper *Mathematics as she are taught, fit the second* presented by Mr. TUCKERMAN on November 20, 1943. It was discussed by Mr. TUCKERMAN.

1231ST MEETING

The 1231st meeting was held in the Cosmos Club Auditorium, March 25, 1944, President STIMSON presiding.

Program: HERBERT G. DORSEY, U. S. Coast and Geodetic Survey: *Radio applied to ocean current observations.*—This instrument, developed by Lt. Comdr. E. B. ROBERTS, of the Coast and Geodetic Survey, consists of a radio transmitter in a floating buoy anchored at the place where observations are desired actuated

by a meter suspended beneath. Vertical vanes on the meter cause it to face the current and an impeller rotates as a function of the current flow. A magnetic drive in the impeller communicates motion to the interior without friction. An alnico compass is pivoted over a horizontal gear, rotating at ½ the speed of the impeller. The horizontal gear carries a planetary rotating at 3/2 the speed of the horizontal. Contacts are arranged to close an electrical circuit on each revolution of the horizontal about the vertical axis of the compass and every other revolution of the planetary. A pair of wires passing through stuffing boxes in the meter and buoy operate a relay to send a radio dash from the battery operated crystal controlled radio transmitter. These dashes are received at a central station, preferably on a surveying ship and actuate a tape chronograph. Dashes by pairs give the velocity of the water and the third dash, by its spacing between the others, gives the direction. Observations are made at several locations by tuning the receiver to different buoys using different radio frequencies. (*Author's abstract.*)

An informal communication on a misconception concerning crystallization in metals, and its appearance in the literature was presented by Mr. TUCKERMAN.

An informal communication on the differentiation of empirical functions was presented by Mr. BLAKE.

1232D MEETING

The 1232d meeting was held in the Cosmos Club Auditorium, April 8, 1944, Vice-President WAIT presiding.

Program: GEORGE F. A. STUTZ, New Jersey Zinc Co. (of Pennsylvania): *Luminescent pigments* (illustrated).—Luminescent materials are described as capable of absorbing invisible ultraviolet light and re-emitting visible light. They are divided into two classes: fluorescent materials glow only while the activating light shines on them; phosphorescent materials continue to glow after the activating light is extinguished. Fluorescent materials include a wide variety of organic dyes, dye intermediates, metallo-organic compounds, and zinc and cadmium sulphides. Phosphorescent materials include zinc sulphide, zinc and cadmium sulphide, calcium sulphide, and strontium sulphide. Activation of these materials is accomplished by a variety of sources of ultraviolet light, including daylight.

Fluorescent materials are used in plastics, wool, silk, cotton or paper, lacquers, printing inks, and powders. Phosphorescent materials are somewhat more limited in application because of coarse particle size. They may be fabricated in plastics, paints, and vitreous enamels. The phosphorescent materials are useful only where their low brightness is adequate. In general, this requires complete or nearly complete darkness and dark-adaptation of the observer.

Radioactive materials are a third type of luminescent materials, the activation in this case being furnished by an admixed radium compound. Such materials require no activation by external light sources.

The application of luminescent materials in the present war effort has resulted in a number of newly developed pigments and in a greater variety of practical applications. A demonstration of prewar applications, wartime applications, and possibly postwar applications is given. (*Author's abstract.*)

1233D MEETING

The 1233d meeting was held in the Cosmos Club Auditorium, April 22, 1944, PRESIDENT STIMSON presiding.

Program: JOHN G. KIRKWOOD, Cornell University: *The structure of liquids.*—The structure of liquids on the molecular scale has been investigated on the experimental side by the X-ray scattering technique and on the theoretical side by the methods of statistical mechanics. Although liquids lack the long-range order characteristic of crystal lattices, they are found to possess residual local order maintained by each molecule in its immediate environment. Local order in liquids is characterized by the radial distribution function, which specifies the average local molecular density in the vicinity of any given molecule. The radial distribution function is characterized by a series of rapidly damped maxima and minima corresponding to a blurred crystalline arrangement of neighbors merging into randomness at distances of several molecular diameters.

The X-ray scattering technique for the investigation of liquid structure was originated by Zernicke and Prins and by Debye and Mencke. By means of a Fourier integral inver-

sion the radial distribution function may be calculated from the intensity of scattered X-rays measured as a function of scattering angle. The method has been employed to investigate the structure of many liquids and gases.

The methods of statistical mechanics have been used to determine the relationship between the radial distribution function of a liquid and the intermolecular forces acting between its molecules. In this manner it has been possible to make a theoretical analysis of liquid structure and to establish its connection with thermodynamic and other bulk properties of a liquid. (*Author's abstract.*)

An informal communication on focal plane properties of a telescope was presented by Mr. ARCHIE MAHAN.

1234TH MEETING

The 1234th meeting was held in the Auditorium of the U. S. National Museum, April 29, 1944, President STIMSON presiding.

The thirteenth Joseph Henry lecture, entitled *Faster than sound*, was delivered by THEODORE VON KARMAN, of the California Institute of Technology. It will be published in this JOURNAL.

1235TH MEETING

The 1235th meeting was held in the Cosmos Club Auditorium May 20, 1944, President STIMSON presiding. *Program:* DEAN B. COWIE, Department of Terrestrial Magnetism, Carnegie Institution of Washington: *The 60-inch cyclotron at the Department of Terrestrial Magnetism.*—The operation of a large cyclotron is dependent upon a large number of electrical and mechanical components functioning in unison. This paper outlined the theory of operation of the instrument and indicated the large number of safety factors included in its construction to assure continuous reliable operation.

The principles of artificial radioactivity were briefly discussed to indicate ultimate use of the products of the cyclotron in medicine, physics, and industry. Perhaps the most important use could be ascribed to the "tracer technique of radioactivity" where the various radioactive isotopes are used to follow chemical and biological processes heretofore impossible by other means.

Some discussion was made concerning the protection of personnel both from the large amounts of radiation produced by the cyclotron and from the electrical hazards associated in its operation. A specially designed building housing the instrument incorporates many automatic safety measures eliminating many sources of danger. (*Author's abstract.*)

Mr. Tuckerman presented an informal communication on lack of rigor in textbooks of calculus.

ARCHIE BLAKE, *Recording Secretary*

CHEMICAL SOCIETY

564TH MEETING

The 564th meeting was held at George Washington University on October 12, 1944. At the conclusion of a general meeting the following divisional meetings were held:

Biochemistry, HUGH J. CREECH, *presiding*

Some properties of cystine oxidase. J. P. GREENSTEIN (National Cancer Institute).

The determination of tryptophane in proteins and foods. (a) *A rapid colorimetric method for the determination of tryptophane.* M. J. HORNE and D. B. JONES (Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture). (b) *Two microbiological methods for the determination of l-tryptophane.* G. G. WOOLEY and W. H. SEBRELL (National Institute of Health).

Organic Chemistry, L. W. BUTZ, *presiding*

The phosphorylation of 4,4'-diaminodiphenylsulfone and conversion of the products into amidophosphoric acid derivatives. ERNEST L. JACKSON (National Institute of Health).

A study of the direction of enolization of 3-nitro-4'-methoxydibenzoylmethane. R. PERCY BARNES and JONATHAN L. SNEAD (Howard University).

The cyclopentenolone components of pyrethrins. F. B. LAFORGE and W. F. BARTHEL (Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture).

Physical Chemistry, M. H. VAN HORN, *presiding*

The use of the mass spectrograph in studies of hydrocarbon mixtures. A. KEITH BREWER (National Bureau of Standards).

The mechanism of certain organic reactions in non-aqueous solvents. A. L. SKLAR and JOHN DUFFIE (Catholic University of America).

The determination and elimination of liquid junction potentials. GEORGE F. MANOV, N. J. DA LOLLIS, and S. F. ACREE (National Bureau of Standards).

Inorganic and Analytical Chemistry,
R. E. STEVENS, *presiding*

New developments in the use of sealed tubes in chemical analysis. C. L. GORDON, W. G. SCHLECHT and EDWARD WICHERS (National Bureau of Standards and U. S. Geological Survey).

Internal structure and decomposition of crystalline materials. W. G. SCHLECHT and K. J. MURATA (U. S. Geological Survey).

Spectrographic sensitivity of elements in silicate materials. K. J. MURATA (U. S. Geological Survey).

Analytical patterns in inorganic analysis: Applications to mineralogy, metallurgy, and histology. HERMAN YAGODA (National Institute of Health).

565TH MEETING

The 565th Meeting was held at the Cosmos Club on November 9, 1944. Dr. KENNETH C. D. HICKMAN, Distillation Products, Inc., spoke on *An in vitro chemistry of nutrition (with special reference to vitamins A and E)*. The election of officers for 1945 was held with the following results: President, H. S. ISBELL; Secretary, L. A. SHINN; Treasurer, J. J. FAHEY, Councilors, N. BEKKEDAHL, N. L. DRAKE, W. L. HALL, H. L. HALLER, W. J. HAMER, F. C. KRACEK, B. H. NICOLET, N. K. RICHTMYER, J. H. ROE, E. R. SMITH, B. D. VAN EVERA, J. K. WOLFE; Managers, R. GILCHRIST, A. T. MCPHERSON, W. I. PATTERSON, J. L. SVIRBELY, W. W. WALTON, C. E. WHITE.

566TH MEETING

The 566th meeting was held at the Cosmos Club on December 14, 1944. Dr. NORMAN BEKKEDAHL, of the National Bureau of Standards spoke, on *Rubber research in tropical Brazil.*

. LEO A. SHINN, *Acting Secretary*

ANTHROPOLOGICAL SOCIETY

The Anthropological Society of Washington at its annual meeting held January 16, 1945, elected the following officers: President, T. DALE STEWART; Vice-President, REGINA FLANNERY; Secretary, WILLIAM N. FENTON; Treasurer, WALDO R. WEDEL; Members of the Board of Managers, W. M. COBB, WM. H. GILBERT, ALFRED MÉTRAUX, MAURICE A. MOOK, and JULIAN H. STEWARD.

A report of the membership and activities of the Society since the last annual meeting follows:

Life members, 1; active members, 63; Associate members, 24; total, 88. This represents an increase of 21 over last year.

The members elected during the year were: Dr. JOHN M. ARMSTRONG, Rev. HUGH BIHLER, S.J., HUNTINGTON CAIRNS, JOSEPH BLAKE EGGEN, WILLIAM LEO HANSBERRY, Mrs. ANNE FROMME HERTFORD, Dr. FREDERICK S. HULSE, Dr. EDWIN M. LOEB, ERNEST MAES, Dr. PEVERIL MEIGS, JOHN A. POPE, Sister LUCIA VAN DER EERDEN, Dr. A. J. WARING, JR., active members; Mrs. SUSAN W. ARMSTRONG, Miss ELIZABETH BACON, Lt. FREDERICA DE LAGUNA, U.S.N.R., GORDON W. HEWES, Lt. W. W. HOWELLS, U.S.N.R., Lt. Comdr. A. H. LEIGHTON, U.S.N.R., Dr. DOROTHEA C. LEIGHTON, Dr. MARGARET MEAD, Dr. J. S. SLOTKIN, Dr. LAURA THOMPSON, Dr. GEORGE L. TRAGER, Capt. WILLIAM L. VAN NESS, associate members.

One member, Dr. WILLIAM H. SPINKS, active member since 1942, was lost through death. The Society voted to record its deep sense of loss at the death of this member and to extend its sincere sympathy to his wife.

The report of the Treasurer follows:

Funds invested in Perpetual Building Association (with interest to July 1, 1944)	$1,789.35
21 shares Washington Sanitary Improvement Co. (par value $10 per share)	210.00
2 shares Washington Sanitary Housing Co. (par value $100 per share)	200.00
U.S. Savings Bond, Series G	500.00
Cash in bank	257.39
	$2,956.74

Bills outstanding:		
To American Anthropological Association (subscriptions to American Anthropologist for 4 members at $5 each)		20.00
To Ricker Printing Co.		21.48
		$2,915.26
Total as of January 17, 1944		2,959.04
Decrease	$	43.78

The Society acted as host to the Society for American Archaeology on the occasion of its annual meeting on May 13, 1944, at the Cosmos Club.

All regular meetings were held at the U. S. National Museum. The May meeting was the occasion of a dinner in honor of Dr. ETHEL JOHN LINDGREN at the National Zoological Park restaurant. Continuing a practice adopted in 1942 of keeping the mailing list current with the roster of anthropologists in Washington, the Secretary has sent out an average of 180 notices for regular meetings. The Washington Urban League members were invited to the November meeting; the social scientists in the Department of Agriculture were invited to the January meeting; 600 invitations went out for Mrs. Roosevelt's lecture, including the membership of the Washington Academy of Sciences.

The Society has continued to enjoy the presence in the Capital of a large number of anthropologists. Some of them have joined our ranks and others have delivered papers. The programs of meetings during the first months of the year continued under the direction of a committee headed by the Secretary. This group, having served two years, requested that a new committee be appointed. The President appointed Dr. JULIAN H. STEWARD chairman and asked Dr. GORDON R. WILLEY and Dr. W. R. WEDEL to serve with him. Turning from the anthropology of war areas, with occasional discussions of theoretical anthropology, the new committee initiated a series of symposia: first, on New World Prehistory, followed by a series of Discussions of Anthropology and Contemporary Problems.

Titles of papers presented before the regular meetings of the Society were as follows:

January 18, 1944, 717th meeting, Dr. GORDON T. BOWLES, *Probable developments in the field of comparative racial anatomy.*

February 15, 1944, 718th meeting, ELEANOR R. ROOSEVELT, *Civilization in the South Pacific.*

March 21, 1944, 719th meeting, RUTH EVANS PARDEE, *Some aspects of Minankábau society.*

April 18, 1944, 720th meeting, Dr. HOMER G. BARNETT, *Emotional factors in cultural change.*

May 31, 1944, 721st meeting, Dr. ETHEL JOHN LINDGREN, *Some current trends in British anthropology.*

October 17, 1944, 722d meeting, Dr. GORDON R. WILLEY, Dr. FRANK H. H. ROBERTS, JR., and Dr. WALDO R. WEDEL, symposium on *Dating in New World Prehistory.*

November 21, 1944, 723d meeting, Discussions of Anthropology and Contemporary Problems—I, Dr. RAYMOND KENNEDY, *Anthropology and Colonial administration.*

December 19, 1944, 724th meeting, Discussions of Anthropology and Contemporary Problems—II, Symposium on *Race contacts and race conflicts;* Dr. MORRIS E. OPLER, *American White-Oriental relations;* Dr. ARTHUR RAPER, *American White-Negro relations;* and Dr. ALFRED MÉTRAUX, *Race relations in Latin America.*

WILLIAM N. FENTON, *Secretary*